

# METAL INDUSTRY

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## Have We Turned the Corner?

FOR almost a month we have with us a new element in our business activities—Confidence. Headlines in the daily press have featured improvement in business whenever it has appeared. The stock market has risen more sharply under the stress of higher trading volume than at any time in the past three years. Statements have been made, some by men of fair prominence, to the effect that the "corner has been turned."

In order to get a fair idea of the facts in our own field, THE METAL INDUSTRY has made a survey through its various correspondents, in order to check these opinions. We give below abstracts of the interviews and information gathered by our representatives in different parts of the country.

### New England

In Waterbury, Conn., John A. Coe, president of the American Brass Company, stated in part, "People are now realizing the evil of hoarding and are starting to buy . . . There has been a little increase in activity in local industries but it has been small and spotty. However, a better feeling exists everywhere . . . I think the turn has come. . . ."

Edward O. Goss, president of the Scovill Manufacturing Company believes that there will be a decided improvement in business before Fall. He expressed doubt as to any material improvement in his locality within the past month, but feels that those who are taking an optimistic view of the next few months are justified.

F. S. Chase, president of the Chase Companies, sees business on the upgrade, stating that there has been a slight increase since the first of August. It is impossible to tell whether or not this increase is significant.

Hamilton Merrill, manager of Manning, Maxwell and Moore, of Bridgeport, Conn., said that he was optimistic and looked for a pick-up this Fall.

From Massachusetts the report comes back that while for the most part there are only feelings of optimism among the metal manufacturers, increased morale is

spreading and has been accompanied in certain cases, by an increase in orders.

### Middle Atlantic States

Although some of the New Jersey industrial concerns report placing additional men at work, Trenton companies declare that business does not show any encouraging upward trend.

The Fall outlook in Rome, N. Y., is "not very healthy," according to John D. Strain, manager of the Industrial Association, which tabulates and charts labor trends in the metal trades in N. Y. State. A canvass among the metal manufacturers of northern New York brought out the fact that many of the executives grant that there seems to be a better feeling about business, but few of them care to be quoted about their particular business or its relative standing compared with previous months.

### The West

In Detroit it is stated that much of promise is developing, but that many of the big plants are less active than recently, as the peak of the automobile manufacturing season is past. Hopes and efforts are centered on the Fall.

In Wisconsin there are indications of improvement largely along the lines of better sentiment and hopes for Fall prospects.

In California the gold mining industry has, of course, for some time been in good condition and has been responsible for a considerable volume of buying of supplies and equipment. Otherwise no outstanding development is noted.

### General Reports

We have, in addition, the results of other investigations by organizations, in and out of the metal field. For example, the National Association of Waste Material Dealers, has just completed a wide canvass of key con-

cerns in the waste material industry from Boston to San Francisco, and as a result "announces with certainty that the depression is on the way out. Price advances run as high as 100 per cent in some instances."

The Associated Business Papers, Inc., organized an excellent quick survey covering 20 industries, through the editors of business journals. In some of these industries very specific, concrete and definite gains are reported. In other lines, where the advance is lagging, the feeling is optimistic.

In the glass, enamel and pottery plants, several thousand additional men have been put to work. This spurt of activity is not normal at this time of the year and is a reflection of the better business feeling which obtains.

Aviation, interestingly enough, has been gaining steadily though slowly for months, and continues to improve.

The improved prices of farm products and foodstuffs are a most encouraging sign.

Marked improvement has developed in textiles. Prices are firm or rising. It is stated, however, that much of the improvement reflects accumulation of postponed buying rather than a fundamental change. Hope for the latter depends upon sustained expansion of activity in industry generally.

The improved price structure in the oil industry seems to be holding firm, and if continued throughout the year, will enable many of the producers to show profits for 1932.

There is a distinct psychological improvement throughout all sections of the jewelry manufacturing industry, and buying is being resumed to a greater extent than is normal for the end of July.

Construction contracts in 37 Eastern states during July were \$15,000,000 above June instead of showing the customary decline. It must be remembered however, that an unusual proportion of the work is being financed by public funds. A definite upturn in engineering construction has been in evidence since early in March and the increase became general about the end of June when declines are normally in order. Some of the materials used have begun to rise in price.

Bituminous activities in the coal industries took a sharp spurt in the closing days of July, but since then labor troubles have developed and are at this time, not yet settled.

Flour milling has been very little affected by the depression, having shown a loss only in foreign sales, but domestic consumption has increased almost enough to offset that drop.

Meat packing is definitely moving ahead under the stimulus of improved live-stock and meat prices. Consumption of meat products was larger during the first

six months of 1932 than in the corresponding period of 1931, and 1931 was ahead of 1930. The outlook for the industry as a whole is very good.

In the steel industry, production continues at the abnormally low rate of 15 per cent. However, scrap prices, considered by many a reliable guide to pending changes, have risen.

Shoe production is rising at more than the seasonal rate and leather prices are stronger.

Automobile sales for July fell under expectations but automobile sales executives are said to be very hopeful.

Probably one of the most reliable week-to-week guides is the release sent out for publication by the Department of Commerce, headed "The Business Situation At Home and Abroad." The latest report at the time of writing this review (August 29) states that for the week ended August 13, the New York Times Index of Business Activity dropped to 52.2 as compared with 52.3 and 53.9 in the preceding weeks. Steel mill activity has receded, and there has been a sharp drop in automobile production. Electric power production was lower. Freight car loadings declined, for the week ending August 6th, but rose slightly, for the following week, continuing at a level about one-third below a year ago.

#### Summary

If it were necessary to go by any one indicator, probably the last quoted statements of the Department of Commerce would be the safest to use. The things in its favor are its unbiased attitude and strict reliability. However, we must take into consideration that emergence from a depression is almost always preceded by improved feeling—sentiment. We shall leave out of consideration the action of the stock market which has led us astray so many times, even though it is often correct in its predictions. The fact is that in certain lines there has been very definite improvement in the prices of raw materials and in real activity. To be sure, these lines are few. But it is also an unquestioned fact that sentiment has improved.

Such sentiment does not guarantee a rise in business, but no important business improvement is possible without it.

To sum up in a very few words, there are scattering indications of business improvement. It is possible that we have reached bottom and are now on the way out. Even if this should be true, however, it is far from certain that our troubles are over. Improvement, when it comes, is almost sure to be slow and perhaps spotty. But there seems to be a fair amount of evidence that the worst of the depression has been passed.

### Largest Bronze Plates Cast

With ordinary equipment but unusual ability, the F. H. Koertke Brass and Manufacturing Company, New Orleans, La., has completed a job some eastern foundries are said to have turned down for lack of special equipment. The job was casting four bronze plates 5 by 9 feet in area, carrying between 6,000 and 7,000 letters each. They are the largest plates of the kind known to have been cast in the United States. The plates weigh over 1,500 pounds each. The largest plates of

this character heretofore cast were 4 by 6 feet in area.

The difficulty encountered was chilling of the metal before pouring was complete. This was overcome after three attempts by simple care and agility on the part of the workmen. The temperature variation on the successful attempt was within five degrees.

The plates were designed for the Memorial Tower of Louisiana University.

G. N. C.

# Materials Handling in the Small Brass Foundry

By D. G. ANDERSON and B. F. McAULEY

Foundry Engineer and Materials Handling Engineer,  
Respectively, Western Electric Company, Inc., Chicago, Ill.

**This Paper Describes in Detail the Sand-Handling and Sand-Conditioning Equipment, Methods of Pouring and Handling Molds, and Cleaning Arrangements. Results Have Been Such as to Justify the Methods Installed in This, a Small Brass Foundry**

A PAPER READ AT THE MEETING OF THE AMERICAN FOUNDRYMEN'S ASSOCIATION IN CHICAGO, ILL., MAY 2-5, 1932

ONE of the recent trends in foundry practice, as in numerous other industries, has been the development of equipment to speed up production by improvements in materials handling methods. There are few foundries exactly alike, yet there are a great many foundries which are faced with the problem of installing improved equipment to reduce costs and meet present-day competition.

However, the foundryman planning to improve his plant may find it difficult to decide upon what sort of equipment and layout will serve him best. This is because the improved equipment must be correctly applied to the local conditions existing in each particular foundry.

The brass foundry at the Hawthorne Works of the Western Electric Co. is devoted to the production of non-ferrous castings that are required in the manufacture of telephone equipment. It occupies an area of  $75 \times 125$  feet in a wing of the main foundry, and its normal capacity has been doubled within recent years by the introduction of new equipment.

The majority of the individual castings made in it are small and of a wide variety of design. Accordingly, it can be considered in the small or jobbing foundry class.

While such a small foundry does not lend itself as readily to mechanical handling as do larger foundries which are laid out on a basis of heavy production schedules, has been found that the introduction of more efficient equipment with the improved sequence of operations described below has been justifiable.

## Foundry Equipment and Procedure

Fig. 1 shows a diagrammatic section of the sand-conditioning unit.

Shakeout sand is dumped through protected openings in the floor onto an 18-inch rubber-covered conveyor belt which carries the sand to the boot of an enclosed elevator. The returned sand is carried upward by a standard bucket elevator with buckets mounted on a rubber-covered belt, and discharged onto a vibrating screen. The screen cloth has a diagonal mesh of  $\frac{1}{4}$  by 1 inch, which permits the sand to flow through it into a storage hopper. Any cores and bits of metal are discharged over the screen into a container on the floor.

## Control of Sand Condition

From a measuring hopper of 10 cu. ft. capacity, located at the bottom of the storage hopper, the used sand is discharged into a mulling type of sand mixer. Here both water and new sand are added in order to bring the sand up to its proper consistency for molding.

Water is added by means of a gravity flow from a small measuring tank. It enters the mixer from six nozzle

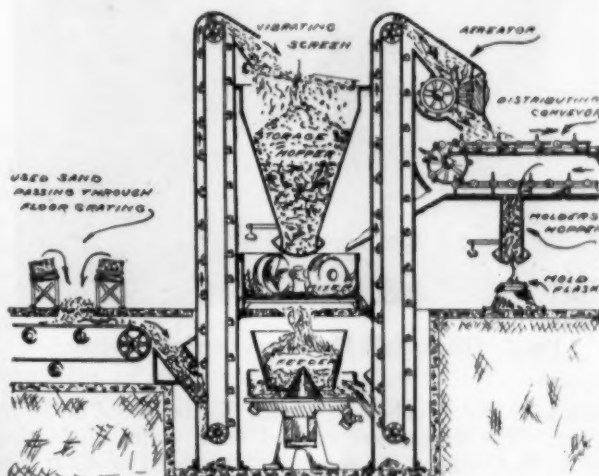


Fig. 1—The New Method of Handling Molding Sand.

openings located around the edge of the machine. The relative moisture is determined by an electrical resistance moisture-meter installed on the mixer. This instrument has proved to be very valuable in maintaining a uniform moisture in the sand.

After a mixing of approximately three minutes, the prepared sand is discharged on a table-feeder located in a pit under the mixer. The table-feeder has a raised conical section at the center. This tends to throw the sand against a fixed retaining plate around the circumference of the table as the latter rotates.

There is an opening between the table feeder and the housing through which a plow is inserted to scrape sand

off the rotating table. The rate at which sand is discharged from the table-feeder is regulated by the setting of the plow.

This feature permits continuous feed from the table as the plow deflects the sand to a bucket elevator from which it is discharged into an aerator. In passing through the aerator, the sand is thrown at high velocity through a series of wire brushes that break up any small lumps which may be present. The sand is light and fluffy when discharged from the aerator to the flight conveyor.

#### Conveying Conditioned Sand

The aerated and conditioned sand is conveyed to the molding positions by a double-deck drag conveyor 15



Fig. 2—Filling Mold Flask from Overhead Hopper.

inches wide and 7 inches deep, with flights spaced on 18-in. centers. The flights are carried on a roller chain that runs on light rails. At the operating speed of 40 ft. per min., the capacity of the conveyor is 25 tons of prepared sand per hour. The flights travel in built-up rectangular troughs open at the top.

Sand from the aerator is carried in the upper trough to the far end of the conveyor, where it is dumped over the take-up end into the lower trough. The molder's hoppers are filled automatically as the flights in the lower trough pass over openings leading to them. Three of the flights are fitted with rubber tips in order to keep the conveyor free of any sand that may accumulate and dry out.

The molder's hoppers are circular, with a diameter of 14 inches at the top and 16 inches at the gate. This prevents the sand from sticking in the hoppers and insures a positive flow whenever the discharge gate is open, as shown in Fig. 2.

Deflectors are mounted beneath the gate to direct the falling sand into the center of the flask on the molding

machine below. The entire construction of the hopper eliminates waste time due to clogging sand and unnecessary spillage.

#### Mold Conveying Problems

The completed molds are placed on roller conveyors of the lateral-slope type. Unprotected molds made in snap flasks are used exclusively. Ordinarily, molds are contained in flasks when moved on a roller conveyor; but experiments proved that unprotected molds could be conveyed successfully by employing protecting contacts, that is, cleats on the bottom board which protect approximately one-half inch, making a separation of one inch between molds.

The flask sizes are selected to produce the maximum number of good castings per day. This usually is not the largest flask or the pattern design that produces the greatest number of castings in one mold. Large flasks cause fatigue, and small patterns grouped close together frequently cause the separating sand walls to fracture when the pattern is drawn.

We have found by experience that the largest mold which can be used economically is 10 × 18 in. with 4 in. cope and drag. Furthermore, the most satisfactory mold size, from the standpoint of convenience of handling, is 10 × 14 in., with up to 4 in. cope and drag.

#### Inspection and Maintenance

The complete sand-preparation and sand-handling unit is so constructed that it can be easily inspected and maintained. All the overhead equipment is readily accessible from a walk-way that extends the length of the conveyor. The underground equipment has lighted walk-ways along its entire length. This not only facilitates repairs, but enables the pits to be kept clean.

Moving units are equipped with individual drives and, except for a belt drive on the vibrating screen and a direct motor-drive on the aerator, herringbone-gear speed reducers are used. All moving parts are equipped with grease fittings, and the bearings are protected from sand and dust.

The sand-handling equipment is controlled from a push-button control panel with pilot lights for each unit. All units of the prepared-sand and shakeout-sand systems are electrically interlocked so that no material may be conveyed until all units are in operation. This prevents sand from piling up at any point should one unit stop.

#### Sand Control

Since the functioning of the above-described unit depends on the uniformity of molding sand, it was necessary to introduce a control on the consistency of the sand. Accordingly, sand-testing laboratory was set up having equipment conforming to standard or tentative methods of test of the American Foundrymen's Association.

Inasmuch as uniform mixing is necessary to produce uniform results, a limit was set on the mixing time. It was found that the desired results were obtained if water was added one-half minute after the sand had been charged into the mixer and if the sand was discharged two minutes after the mixer had been charged. At no time is the sand allowed to remain for a longer period than four minutes.

In order to replenish losses, new sand additions are made at intervals of not less than one-half hour. Each of these charges is introduced through the openings of the shakeout system, and consists of not more than 200 lbs. By using this procedure the new sand is distributed uniformly in the storage bin and, hence, throughout the system.

### Benefits Resulting from Sand Control

A control of the consistency of the sand has proved of great advantage in controlling the quality of product. The results of it have manifested themselves in a reduction of scrap due to holes, warped castings, "drops," "blows" and "washes." The uniform sand has enabled the molder to regulate his machine-molding practice and to use the same molding pressure day after day for a given job. The pourer also depends upon the moisture content being uniform in determining the temperature for the metal and the chill effect within the mold.

### Melting and Pouring Equipment and Procedure

Electric rocking arc furnaces having an output of 1400 lbs. per hour are used for melting the various brass alloys. With these furnaces it is possible to use considerable quantities of scrap punchings and baled copper wire in the charges. Since the atmosphere is kept free of oxygen by the burning carbons, no difficulty is experienced in regulating the mix or controlling the melt.

### Great Attention Given Safety and Health

The complete melting equipment occupies an area of 720 sq. ft., all of which is located under a hood from which the hot gases and fumes are removed by an exhaust system. The quantity of air removed in this manner has a

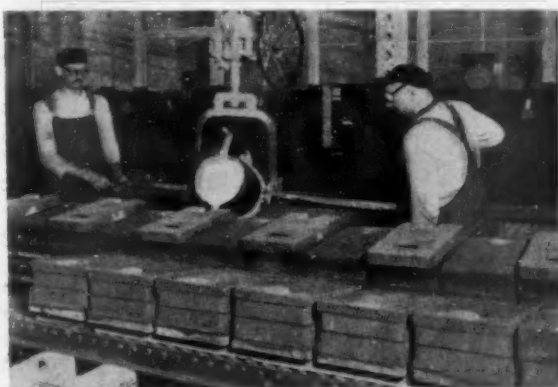


Fig. 3—Pouring Arrangement. Molds Are Poured by Special Pouring Crews.

beneficial effect on the whole foundry, in that the positive circulation of air greatly reduces the quantity of dust particles in the atmosphere.

Cast-iron plates, covered with carborundum and flush with the concrete floor, are placed between the pedestals and in front of each furnace. These plates protect the floor from spilled metal and provide good footing for the operator. A small sheet-metal deflector that can be easily removed is mounted over the furnace opening to disburse glare as much as possible.

The crucibles of molten metal are conveyed from the furnace on a small dolly truck, which eliminates the hazard of spilled metal. The dolly fits between the furnace pedestals.

When the crucible has been filled, the dolly is moved clear of the furnace. The crucible with the pouring device then is picked up on a monorail system serving the mold storage floor, each bay of which is equipped with a traveling monorail that provides accessibility to each of the pouring racks in it.

The pouring of molds is handled by experienced men, while the molders remain at their machines. Alternate molds on the storage lines are poured (see Fig. 3), after which the mold weights are placed on the adjacent molds

and the remainder poured. The transfer of the hot mold weights is made with tongs that fit into recesses in the top of the plates. The use of such tongs greatly reduces the hazards of the manual handling operation.

### Cleaning Equipment and Procedure

Sandblasting is used for cleaning the castings because the cutting action of the sand stream removes all scale from the surfaces exposed to the direct action of the blast. Small castings are cleaned in two sandblast barrels consisting of a rotating cylinder which contains the parts and tumbles them in the path of the sand stream.

A 200-lb. charge of medium-size castings is thoroughly cleaned in ten minutes, or in one-third the time required with water tumbling barrels. Large castings are cleaned rapidly and without dust in a sandblast cabinet.

### Conclusions

The studies and changes effected have demonstrated that production methods can be applied economically in a jobbing foundry. The important developments brought out in the Western Electric Company installation are as follows:

(1) That one grade of molding sand can be used for the production of a varied line of non-ferrous castings. A uniform grade of molding sand makes practical the use of a single sand-handling unit.

(2) That unjacketed molds can be safely moved on roller conveyors into position for pouring.

(3) That metal of high quality can be produced in an electric arc furnace from a melting stock compounded of scrap materials.

(4) That small lots of castings can be cleaned rapidly in tumbling barrels of special design.

### Preece Test for Zinc Coatings

By H. H. WALKUP AND E. C. GROESBECK\*

The results of a study of some factors involved in the Preece test for testing zinc coatings on ferrous products are presented in this paper. The Preece test has been severely criticized by various authorities because of the erratic results which are sometimes obtained, although it finds a wide use, for inspection purposes, in determining the uniformity of the coating. This study was undertaken with the aim of ascertaining the underlying causes for the reported erratic results.

A prominent characteristic of these erratic results is the formation of false end points, that is, the appearance of adherent copper on the zinc coating before the underlying base metal has been reached. The causes producing these false end points may be grouped under three general classes: (1) variation in nature of zinc coating, (2) variation in copper sulfate solution employed, and (3) manipulation. False end points were obtained by various experimental methods.

The results of two series of experiments carried out with hot-dip galvanized, "galvannealed," zinc, iron, and steel wire specimens are shown diagrammatically.

By investigating the effects produced by variations in the potential and pH value of different types of zinc coatings and copper sulfate solutions, it was determined that false end points can be formed by the lodgment of copper particles on the specimen surface. The effects of certain variables on the adherence of copper deposits on the iron or steel base at the true end points were also investigated.

\* A paper presented at the Thirty-fifth Annual Meeting of the American Society for Testing Materials, 1315 Spruce Street, Philadelphia, Pa., held at Atlantic City, N. J., June 20-24, 1932.

# Oxwelding Brass and Bronze

## Fusion Welding of Brass and Bronze Improved by Correct Flame Adjustment

FROM "OXY-ACETYLENE TIPS," AUGUST, 1932

**R**ECENT developments in the application of brasses and bronzes, particularly the rapidly increasing use of extruded brasses and bronzes as well as castings and forgings for ornamental work, have focused attention on the fusion welding of these alloys by the oxy-acetylene process.

For general industrial purposes bronze-welding is widely used to produce perfectly satisfactory joints in most of these alloys. For the more recent applications, particularly in ornamental work, fusion welds are often preferable and in some cases the only type of welding possible. To be satisfactory for this type of work, the welds must have certain definite characteristics, among which the most important are: (1) the weld metal must be perfectly sound and free from porosity so that the joint will not be perceptible on a polished surface; (2) the weld metal must, in many cases not only match exactly the color of the base metal at the time the weld is made, but the color of the weld metal must follow the changes in tone which occur in the base metal on exposure or weathering under interior or exterior conditions, as the case may be.

The technique formerly used for the fusion welding of these copper base alloys did not produce results that were entirely satisfactory for these newer applications. An exhaustive investigation of this problem by Union Carbide and Carbon Research Laboratories, Inc., has resulted in the development of suitable techniques for producing sound fusion welds, free from porosity, in the various types of commercial brasses and bronzes. In general, the production of high quality fusion welds in these alloys

this article to indicate how the proper flame adjustment can be determined for each alloy.

The brass alloys are those in which copper and zinc are the essential components, the zinc content ranging from 15 to 40 per cent. Ordinary machine brass contains from about 60 to 68 per cent copper and 32 to 40 per cent zinc, whereas the red brasses contain from 75 to 85 per cent copper, the remainder being zinc. Intermediate alloys frequently contain 1 per cent or more of tin, manganese, iron or lead.

A bronze may be of almost any copper base composition, but as a usual thing this term is reserved for alloys containing relatively high percentages of tin and lead with or without small amounts of zinc. Typical compositions are: 90 per cent copper and 10 per cent tin; 85 per cent copper, 5 per cent tin, 5 per cent lead, and 5 per cent zinc; 88 per cent copper, 10 per cent tin, and 2 per cent zinc. In addition, there are a number of miscellaneous alloys such as those containing various amounts of nickel, which gives the alloys a whiter color. Practically all these compositions are found in either cast or rolled condition, and a number of them are extruded into a wide variety of special shapes.

As has been indicated, welds in any of these materials must perform certain functions. Occasionally the tensile strength of the weld is an important factor, but as a usual thing for welds in these types of materials, the soundness or freedom from porosity of the weld metal and the color of the weld metal are important conditions to be considered.

In welding castings it is essential that the color of the deposited metal match the color of the base metal, and that the weld be equally as sound as the base metal.

Extruded shapes usually are not subjected to much stress, but here again it is essential to match colors and eliminate all porosity so that the joint will not be evident when the surface is given a high polish.

All of these alloys are quite similar in exhibiting an unsatisfactory behavior when welding is attempted with a neutral blowpipe flame. In some of the brasses, the zinc distills off in the heavy clouds when the alloys are melted; while with the alloys containing some lead, it is very difficult to attain a fluid condition of the base metal because lead melts out and covers the surface of the base metal making it difficult to melt the welding rod into it.

When bronzes high in tin or lead are heated certain constituents melt and exude from the metal at a temperature considerably below the melting point of the alloy.

All of these metals, both brasses and bronzes, boil when melted with a neutral flame. This condition is conducive to the development of gas inclusions so that porosity becomes a characteristic of the weld metal produced when these alloys are welded with a neutral flame.

For some time it has been known that by using a properly adjusted oxidizing flame instead of a neutral



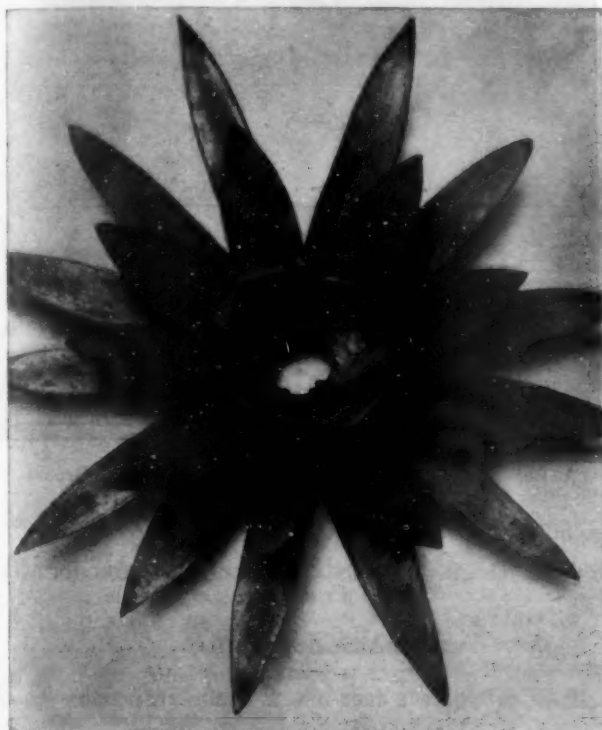
Bronze Ventilating Aperture Cover Fabricated by Fusion Welding with Perfect Color Match.

is dependent upon the use of a welding flame containing an excess of oxygen. The exact adjustment of the flame varies with the different alloys and it is the purpose of

flame, the porosity of the deposited metal can be considerably reduced. The present investigation was carried out to determine the best flame adjustment to enable a welder to produce sound, good quality welds in the various copper base alloys. It was found that each type of alloy required a slightly different flame adjustment. The procedures for determining the proper adjustment in each case are discussed in the following paragraphs.

#### Flame Adjustment for Welding Brasses

When welding brass, if the base metal is brought almost to the melting point by means of the neutral flame, it will be noticed that zinc fumes start coming off and that



Ornamental Bronze Water Lily Fabricated Entirely by the Blowpipe.

the surface of the metal is rather bright. If the flow of acetylene is then gradually reduced, or the flow of oxygen increased gradually, it will be noticed that at a



The Neutral Oxy-Acetylene Flame. First Blowpipe Adjustment for Welding Brass or Bronze.

certain point of excess oxygen flame adjustment a distinct coating is formed on the surface of the brass. The flame adjustment for this is quite strongly oxidizing. Avoid increasing the oxygen in the flame beyond this point, as the coating or film would then become so very thick and refractory as to interfere with welding.

By using the oxidizing flame adjustment which just begins to produce the film, that is, when the coating just

becomes visible, the boiling and fuming of the base metal will be practically eliminated; and this is the point at



A Controlled and Experimentally Determined Excess of Oxygen in the Flame Is Ideal for Welding Brass or Bronze.

which the very best weld, free from porosity and of good tensile strength, is produced.

Due to the formation of the coating on the molten puddle, it is necessary to use a suitable flux whether any rod metal is being added or not.

The flux is best applied by mixing with water to form a paste which is painted on the rod and on the base metal along the scarf.

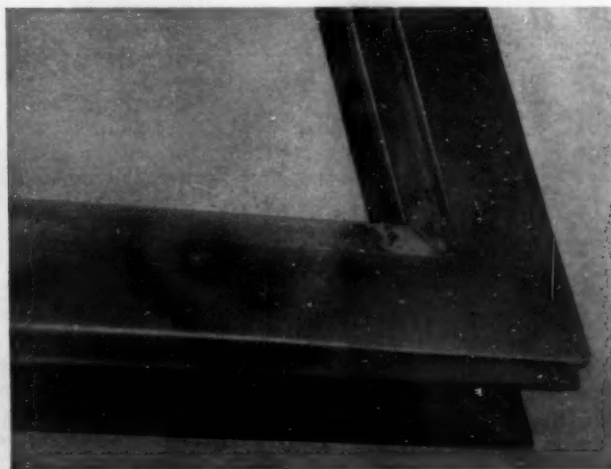
Either forehand or backhand welding may be used, although as a general rule, forehand welding will produce more satisfactory results.

Always keep the surface well fluxed so that it will not be necessary to force the weld into the puddle. Do not overheat the metal or the rod as this will cause fuming of the zinc of the alloy.

#### Flame Adjustment for Welding Bronzes

When fusion welding the bronzes which contain relatively high amounts of tin or lead, or both, it will be observed that these constituents start boiling out before the base metal is even at a red heat. By using a strongly excess oxygen flame, however, for both the preheating and the welding this tendency for boiling out of tin and lead is eliminated.

After the base metal has melted and there is a noticeable film on the surface of the molten puddle, the amount of excess oxygen in the flame should be varied over a fairly wide range, during which it will be found that for one particular flame adjustment the film or coating tends to disappear and a bright surface is maintained on the metal. This is the correct flame adjustment necessary for good welding of the high tin, high lead copper alloys. Usually



A Finished Extruded Brass Welded Window Frame. Note Perfect Color Match and No Evidence of Weld on Polished Surface.

a few preliminary trials will determine this adjustment, and once found, welds free from holes or gas inclusions and with well distributed tin and lead content can be made.

With alloys containing relatively large amounts of lead, say over 5 per cent, some difficulty may be encountered due to the excessive formation of lead oxide, but by the use of an abundant quantity of flux painted on the welding rod this will be largely eliminated. The same fluxes as for fusion welding of brass are found to be most satisfactory.

Welding rod for these bronzes may be taken from the base metal itself, if an exact color match is desired.

#### Special Cases

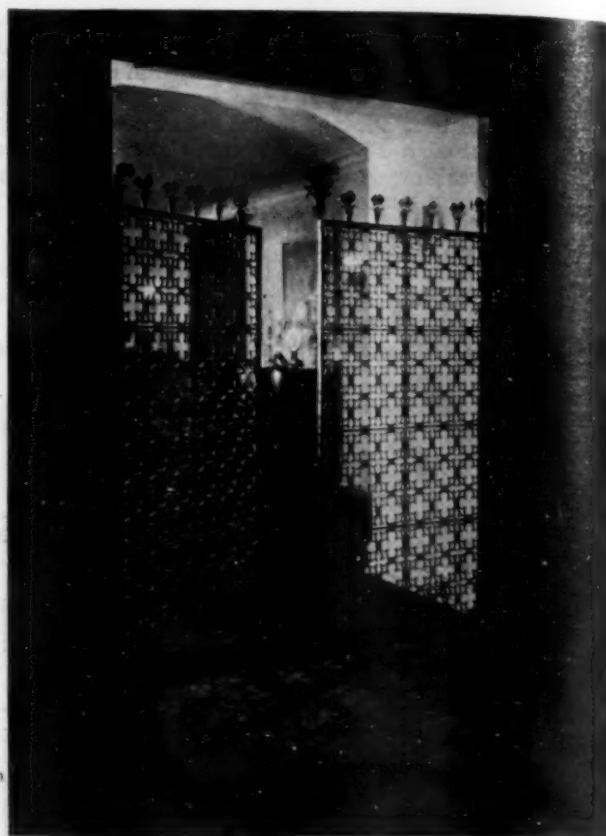
Very little difficulty should be encountered in the welding of rolled or extruded brasses or bronzes because almost any of these alloys that have previously been subjected to hot work during forming have good strength under welding conditions.

There are a few complex casting alloys, however, which may require special care, particularly when welding restrained areas, because these alloys have very little resistance to hot work and to stress at high temperature. Proper preheating will, however, assist materially in relieving stresses in the base metal and this will permit the production of good sound welds.

The most satisfactory way to learn to weld these complex brass and bronze compositions is to obtain samples and experiment with different flame adjustments to determine the proper welding conditions.

The procedures which have been described are being applied with splendid results in welding many commercial brasses and bronzes, particularly those used for ornamental work.

In all of this work, due consideration must be given



A Beautiful Example of Color-Matched Welded Bronze Interior Gate.

to joint design, and method of holding parts for welding.

#### Welding from the Back

In cases where a hair-line is not objectionable on the surface, welding can be done from the back. The two parts are clamped tightly together without veeing, a tack-weld is made at one end of the seam, and welding is started at the other end. This type of joint has the advantage of not requiring any finishing.

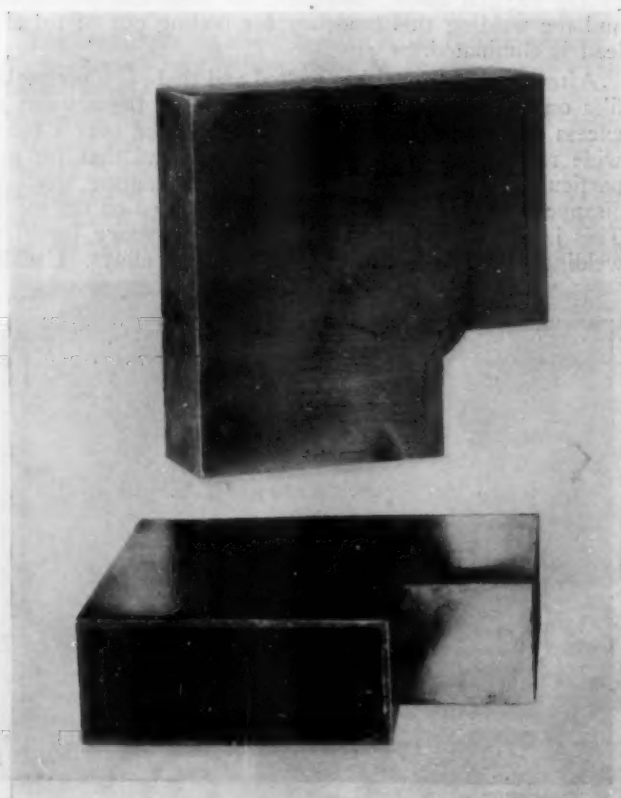
#### Hollow Sections

Where hollow sections are joined, as in the production of doors, window sashes and similar parts, welding must usually be done from the front. The edges of the seams are usually veeed before clamping the assembly in position for welding.

In order to simplify the finishing operations, the weld should be made with only a slight reinforcement, taking care to avoid any low spots. Wherever possible, attachments such as hinges, fasteners or ornaments on a frame should be welded to individual members of the frame before these are assembled into the rigid structure.

#### Summary

Through the use of an oxidizing blowpipe flame, the exact adjustment of which is easily determined by a simple procedure, oxy-acetylene fusion welds of high quality and soundness can be made in all commercial brasses and bronzes.



Close-up View of Oxwelded Joint in Extruded Brass Section. Finished Surface Shows No Evidence of Weld.

## Patent Claims of United Chromium, Inc., Validated by Opinion of Appeals Court

All 18 Claims of the Fink Patent Sustained; 17 Found to Be Infringed  
— Decision Differs With District Court Only As to Grounds

THE United States Circuit Court of Appeals for the Second Circuit, has handed down an Opinion in the case of United Chromium, Inc., Appellee, against International Silver Company, Appellant. The hearings were held before L. Hand, Augustus N. Hand and Chase, Circuit Judges.

This is an appeal by the defendant from an interlocutory decree of the District Court for Connecticut holding valid and infringed claims 1, 2, 3, 4, 5, 6, 10, 11, 12, 13, 15, 16 and 18 of patent No. 1,581,188, issued on April 20, 1926, to Colin G. Fink.

W. Brown Morton for the appellant.  
Newton A. Burgess for the appellee.

### Text of the Opinion

L. HAND, Circuit Judge: This is a suit in equity upon a patent for a process of plating metals with chromium. Infringement being established, the issues turn upon the validity of the patent, and that in turn upon whether it disclosed an invention. The judge held that it did, and gave a decree upon all the claims in suit; it is not necessary to consider the verbal variations between them, except, as appears hereafter, in regard to claim sixteen. Before describing the disclosure it is necessary to say something about the art at large. All electroplating involves the immersion, in a bath of proper solution, of the two poles—the anode and the cathode—of an electric circuit. The current passes through the solution to complete the circuit, and as a result the metal in the solution is deposited upon the cathode—plates it. Thus the object to be plated must be the cathode. All this was a commonplace in other kinds of electroplating, silver, copper, nickel and the like; but the difficulties in regard to chromium were many, the most troublesome of which, at least in 1925, was the composition of the solution or bath; and it is about this that the suit principally turns. Chromic acid in solution had been found to be the most available form of the metal more than twenty years before Fink's application was filed at the very end of the year 1925. It is soluble in water and in anhydrous form consists of a molecule of chromium and oxygen in the relation of one atom of the first, to three of the second ( $\text{Cr. O}_3$ ); the current breaks down the molecule and sets free the chromium near the cathode. The art had added other substances to the solution, as for example sulphuric acid, but after 1920 had come chiefly to rely upon chromic sulphate, which is made up of chromium and a sulphate radical in the form indicated by the chemical symbol  $\text{Cr}_3 (\text{S O}_4)_3$ , two atoms of chromium to three molecules of the composite radical. It is not clear whether the art had recognized that the function of this substance was catalytic, that is, to assist the chemical reactions at which it was present, but not itself to enter into combination. However, Fink stood

upon some ground already gained; he was not the first person who succeeded in electroplating chromium; nor did he claim to be. He did claim to be the discoverer of "a practical and commercially available process"; the question is whether he was justified.

The disclosure is unusually clear; it prescribes the usual detail of electroplating with "a chromium-carrying electrolytic solution, in the presence of a catalyst." The solution is of chromic acid of from one hundred and fifty grams to a litre to saturation, an entirely adequate description. The catalyst must contain an acid radical, stable in the bath, among which are suggested acids and salts having a sulphate, fluoride, phosphate, or borate radical. Apparently the art has in practice only used the first, and to it many of the claims are confined. The catalyst is to be calculated from all sources, both the radical in the chromic acid—which comes in as an impurity—and in the substance added as catalyst, properly speaking. It is never safe to assume that commercial chromic acid is pure; the safest way is to test the solution of chromic acid and correct by adding or subtracting substances which will supplement or decrease the catalytic agent already there. Sometimes instable radicals are in the chromic acid; they will disappear with use, and thus, though initially calculated correctly, they must be replaced by stable radicals so as always to keep the proper ratio. That ratio is between four-tenths of one per cent. and two per cent. with an optimum of one per cent., which is what the defendant and the art generally has come to use with entire success. It has displaced generally, if not altogether, earlier processes of chromium plating.

The disclosure also contained a description of the creation of a hydrogen film about the cathode, designed to protect the chromium cation; that is, the chromium atom positively charged which seeks the cathode. As this is highly sensitive to oxygen, it will readily oxidize unless at the moment of its separation out of the chromic acid it is surrounded by a protecting hydrogen film. On the other hand the film must not be too thick to prevent access of the ion to the cathode. The proper thickness of the film is secured by regulation of the current density which varies with the temperature. As all this plays no part in the case, it will not be necessary to consider it further.

Having obtained his claims on April 20, 1926, Fink apparently became fearful that he might have occupied more of the field than was properly his; and about two years later (June 20, 1928) he filed a disclaimer by which he narrowed all the claims in suit but 3, 16 and 18, adding as an element that the radical must be "regulated . . . in maintaining the efficiency of the bath." With the defendant we read this as meaning that the claims will cover nothing but a process in which the bath is watched as the work goes on, and the proper proportion of the "radical" is always maintained. There is no

\*The text of the decision of the District Court for Connecticut was given in METAL INDUSTRY, November, 1931.

dispute that the defendant does just this, and perhaps, it is necessary to any economic use of the process. At any rate the result of the disclaimer is that an electroplater might prepare a bath after the recipe of the specifications and electroplate the cathode without infringing the claims to which the disclaimer applied; he would infringe only in case he in addition kept an eye on the radicals in the solution.

Much of the defendant's argument depends upon an illegitimate inference from the disclaimer; that is, that it conclusively concedes all the disclosure to have been in prior art except the regulation of the bath after it was formed. From this with much plausibility it continues that there was no invention in regulating any electroplating bath once it had been made; this was the commonest practice in the art generally. This we need not dispute; it would indeed seem a very plain thing, when success depends upon the proper proportions of the ingredients and the bath is used repeatedly, to take periodic samples of the solution and correct any variations which occurred. We do not however agree that a disclaimer has the effect asserted. It does indeed presuppose that the patentee fears he has claimed more than he is entitled to. In the case at bar Fink said that "he had reason to believe that . . . the specification and claims . . . are too broad, including that of which said Fink was not the first inventor," though the statute, (§ 65, Title 35, U. S. C.), speaks only of "claims," of disclaiming "such parts of the thing patented as he shall not choose to claim." It has never been held that the office of a disclaimer is more than to narrow the claim by the added element. The language in *Dunbar v. Meyer*, 94 U. S. 187, 193, 194, is indeed somewhat equivocal; part of it means that the claims alone are limited; another part seems to intimate that what is disclaimed is finally conceded to be in the prior art. But this part was in no sense necessary to the decision, and is not, we think, to be taken literally. In the only cases we have found in which the point was decided, it was held that a disclaimer had no such effect; (*Permutit v. Wadham*, 13 Fed. (2) 454, 457, (C. C. A. 6)\*; *Manhattan Co. v. Helios Co.*, 135 Fed. Rep. 785, 801, 802).

It seems to us that these decisions are right; the patentee has indeed abandoned a part of his original monopoly, and this because he fears that he has gone too far; his fears may not be justified. There is no reason to impute to his caution a declaration about what the prior art actually contains. And even if there were, why should it be more than an admission? It was not a means of procuring his patent; that had already issued; it stood or fell upon the facts as they were. His reasons for voluntarily yielding a part of what he got, cannot stop his mouth, unless it is unjust to speak. But there is no injustice so long as his monopoly is held straitly to the narrowed claims. It is never for instance a good defence to a claim that it might have been broader; the patentee need not at his peril claim all that he might; he does not concede that each element is necessary to avoid anticipation. He may prove an invention broader than he claimed; the unnecessary elements, introduced need not be themselves an invention. Else it would be possible to invalidate any claim by showing that the patentee had yielded too much to the examiner. The function of a disclaimer ends with the retrocession introduced; the patentee is still free to show that the claim covers only a part of what it might. In the case at bar the regulation of the bath was not the invention; it was a trivial part of the claims. What Fink really did was to single out the acid radical as the

catalyst, disregarding the substance which happened to contain it. As we shall show, nobody had thought of this before, and for that reason nobody had found a dependable process. As is generally the case in chemical processes, the important thing was to eliminate the essentials; until this is done, practice must be hit or miss.

We may start with the disclosure of Carveth & Curry which appeared in 1905, more than twenty years before Fink filed his application, and almost as long before he claims to have discovered it. The date alone is significant, because the extensive exploitation of chromium electroplating followed the appearance of Fink's patent, and it has been exploited very extensively indeed. We have no reason to suppose that it would not have been as welcome in 1905 as in 1926. Carveth & Curry were concededly competent chemists, as were those who followed them. Thus we have at the outset a history which is impressive; something had stood in the way of success until after Fink's invention was known. True, it might not be what he added, but there is some antecedent reason to attribute the change to him; (*Kirsch v. Gould Mersereau Co.*, 6 Fed. (2) 793, 794, (C. C. A. 2) ).

These investigators used as one of their solutions about 14% of chromic acid to 1% of sulphuric acid, ( $H_2SO_4$ ); their results were not satisfactory; the deposit flaked off. As we now know the proportion of the radical was in any case far too high; but they had not discovered that the relevant proportion should be between the chromic acid and the radical itself; sulphuric acid contains it, but their paper did not suggest that it was the radical which counted. The proportion between sulphuric acid and chromic acid, even if it be the right one, is not a proportion between chromic acid and  $SO_4$ . It is true that Carveth & Curry were aware of the difficulty of getting pure chromic acid and of the fact that the commercial products contained enough sulphuric acid and other impurities to be important in the result. But they produced no practicable process; they did not even profess to have done so; they were frank to say that other investigators must press their experiments further.

The next laboratory step was embodied in a paper of Sargent, a chemist of standing, which he read in 1920, fifteen years later. He acknowledged his indebtedness to Carveth & Curry and had worked extensively upon their foundation; his own results were the cue to whatever else was done till Fink completed his work, and to Fink's work as well. It is clear that he supposed it necessary to add chromic sulphate to the solution. His theory was that when the chromic acid used contained traces of sulphuric acid as an impurity, this united with the chromium and formed chromic sulphate. It might be necessary to supplement this, ordinarily it would be; but the essential in the process was chromic sulphate. With this and with this alone, except in one unsuccessful case, he experimented; his results were stated in terms of the proportion between it and chromic acid, and the art followed him. Some of his proportions are well within Fink's, though more than Fink's optimum, but he was thinking in other terms. The step may seem easy, having gone so far; but the art did not find it so. Chromic sulphate contained the radical; the sulphuric acid in the chromic acid which combined to form chromic sulphate also contained it; but Sargent did not intimate that the radical alone need be controlled. He had not found the critical element, and his followers never could depend upon his process.

Schwartz worked with Fink upon the experiments which finally took form in the patent in suit. In 1923 Fink read a paper which Schwartz had written. It is important only as showing what he, intimately acquainted with Sargent's work as he was, and competent to push

\* This decision was not reversed in *Permutit v. Graver Corp.*, 284 U. S. 52. The same patent was held invalid for defect in the disclosure, without touching the point now in question.

forward its implications, had in three years been able to do. The percentages again are well within Fink's, at times about his optimum; and some of the results were good. But still there was no suggestion that it was not necessary to use chromic sulphate. Some of the discussion that followed Fink's reading of the paper throws light upon the uncertainties that still existed. For example, Richardson, who had extensively experimented with chromium plating in the Westinghouse Lamp Works, spoke of erratic conduct of Sargent's baths. It was known, he said, that chromic sulphate was the provoking reagent, but at times, even with the purest materials, the bath would only start when dust settled into it; at times it was well to heat it; at times to cool it; sulphuric acid would not serve. This last statement and that about the purity of the materials are alone a conclusive demonstration of the failure up to that time to seize upon the essentials; for sulphuric acid is today a common form in which to add the catalyst; as an impurity in chromic acid it is a catalyst. No one understood this or could, until it was learned that it was the radical in any form which did the work. Two years later in 1925, with the work of Sargent before them, and their own extensive and at times very successful plating, the Bureau of Standards could say: "Although chromium can undoubtedly be deposited from a solution of this" (Sargent's) "composition, the metal efficiency and the character of the deposit tend to vary erratically. This behavior indicates that some variable has not been controlled." They were right. In the same year Proctor, at one time the president of the American Electroplaters' Society, spoke of chromium plating as the missing link of the industry, and not yet "a commercial electro-deposited metal."

Schwartz and Fink were skilled chemists. The two in conjunction did not find the invention at once. Fink claims to have reached it in the spring of 1924; we need not decide whether that is the right date or a year later, for nothing of consequence intervened, as we shall show. For the moment the important thing is that, being men well versed in the art, they had to grope their way. It was only after repeated experiments that it occurred to Fink that the radical alone was the catalyst, whether in chromic sulphate, in sulphuric acid, or not a sulphate radical at all. The optimum ratio then followed from trial and error. Unless, therefore, the art had already learned as much empirically, his idea, when verified, has every mark of an invention. The need had long existed; competent investigators had tried to fill it; they had hit the target, but not the bull's eye; the art accepted and practiced the disclosure with success. In retrospect it now seems inevitable; perhaps it was in time. Chemists were probably bound in the end to learn how to electroplate chromium; it was another species of an art well known. But if this is to be the test, there will be few inventions, or none. The patent law need look only to the last step which overstrode what had so far balked advance. Those decisions which emphasize the implications of existing knowledge (*Atlantic Works v. Brady*, 107 U. S. 192, 199, 200; *Thompson v. Boisselier*, 114 U. S. 1, 18; *Western Elec. Co. v. Rochester Tel. Co.*, 145 Fed. Rep. 41, 42 (C. C. A. 2)), are speaking of smaller gains within the compass of the routine chemist, electrician or artisan; that is not a severe test. But while the law grants its monopoly only to those whose originality is out of the common, it does not demand genius. We cannot safely say in retrospect that that was simple which skilled and ingenious experimenters did not contrive.

The defendant relied upon four prior uses; of the Bureau of Standards; of the Eastman Kodak Co.; of the Westinghouse Lamp Co. at Bloomfield, New Jersey; of the same company at Pittsburgh. While the Bureau of

Standards had experimented with chromium plating in 1922, following Sargent's paper, their only important work was in 1924, and would be too late if we were to accept Fink's date. It is plain that they often got good results; it is equally plain that they did not know on what those results depended and could not rely upon producing them. They always used chromic sulphate as the catalyst and never tested their chromic acid for impurity. The defendant repeatedly speaks of the ratio between their chromic acid and their "radical." They knew no radical in the sense that the art now knows it, as their own declarations prove. They always added chromic carbonate or its equivalent and thought they must, just as they thought they must have chromic sulphate. It is not necessary to go further than their bulletin of June, 1927, in which they repudiate this belief, and attribute the value of the carbonate to its "sulphate content," which was an impurity. Nothing could better prove that they had been working blindly. Chance hits in the dark will not anticipate an invention.

The Eastman Kodak Company plated a large wheel in July, 1925; they had been experimenting for two or three years earlier. They too used Sargent's paper as a basis, but made no analysis of the chromic acid for the radical, nor of the chromic sulphate, to which, following him, they confined themselves. At times they got good results, as would be the case when the proportions were right, but they did not know how to control them.

At Bloomfield, Richardson was in charge; the supposed anticipation was in 1922 and 1923, earlier than any date claimed by Fink; but, as we have said, at the end of September, 1923, Richardson declared after hearing Schwartz's paper, that sulphuric acid could not be used, and that a balky bath of the purest materials would at times be cured by dust. He did know that the sulphate—by which he meant chromic sulphate—was in some way the cue, but even in that he was wrong, as his comment about sulphuric acid shows. This was after all but two of the analyses on which the defendant relies, and these two added nothing.

Piersol took up chromium plating in the Westinghouse works at Pittsburgh in the spring of 1924. He also followed Sargent and Schwartz, and in May, 1924, filed an application using a ratio of two to four hundred of chromic acid to three of chromic sulphate. He did not then know of the sulphate in the commercial chromic acid, but learned to count with it in September of that year. Thereafter he returned to the sellers all chromic acid which had more than one-fifth of one per cent. To what he kept he added chromic sulphate in what he considered the proper proportions. The working cards do show that the sulphate radical was calculated, but it was by way of computing chromic sulphate, which alone, in common with Sargent, he thought important.

It is apparent that he had not grasped the critical facts. Had he done so, he would not have sent back the impure chromic acid; he would have supplemented it with the radical in another form. Indeed, Fink's practice is to take commercial chromic acid and compute the impurities. One-fifth of one per cent would need addition in the bath, but it would be entirely acceptable; much greater impurity would be. The factory made a great number of baths; until about the first of October the proportion of chromic sulphate was generally if not always far too high; as was also the radical though that is unimportant for the reason just given. After September they used a number of baths in which the chromic sulphate and radical were within Fink's formula; but as late as December, 1925, occurred baths in which both the chromic sulphate and the radical ran well above his maximum. The proof is too uncertain

that they had even established any limits to the ratio in terms of the sulphate; it certainly does not disclose the idea that the radical alone was important. It is moreover significant that with much work done, some of it satisfactory, the company did not go into commercial production until the autumn of 1926, five months after Fink's patent appeared.

And so we find the invention good. The disclosure is attacked as inadequate, but ineffectually. The regulation of the bath was described in part in the specifications; in general the art knew it. The anode is not defined; it need not have been, for Sargent had worked out that part of the process and the art knew that too. The invention lay not in any of this, but, as we have said, in the composition of the bath, which nobody before had described or known. It makes no difference that the specifications contained more, or did not repeat what was already known. They

contained the pregnant facts, clearly, adequately; for the first time the art could turn out chromium plating with certainty.

Claim sixteen requires that the bath shall be analyzed after the ingredients have been put in. The defendant's process, as agreed upon by stipulation, is not that. It puts in the proper proportions of chromium and sulphate radical at the start. The difference is not important, but the claim is clearly to cover practice in which commercial chromic acid alone is first used in the solution and the proper ratio established later. All the other claims are infringed, and the decree was right except as to sixteen. As claim sixteen is valid, there is no reason not to award costs to the appellee.

Decree affirmed, except as to claim sixteen, but reversed for non-infringement as to that. Costs to the appellee.

## Non-Corrosive Metal

**Q.**—ONE of our correspondents in South America is installing electrical circuit boxes. The location of these boxes is such that it is necessary to enclose them in an alloy box for protection against the severe conditions which obtain in that locality. The alloy which they have tried out consisted of 88½ per cent copper, 8 per cent tin, 3½ per cent zinc and 0.4 per cent phosphorus, has failed; Muntz metal and 85-5-5-5 have also failed. An iron box plated with cadmium has failed. Can you suggest an alloy for this box or perhaps the proper metal with which to spray an iron box?

The box is 25¼" x 12½" x 6½" - ½" thick.

(This problem was submitted to three different experts. Their answers follow.—Ed.).

**A. (1)**—I do not quite get what the trouble is. However, I assume the trouble is a corrosive or an acid condition, and in that event I would suggest an alloy of:

90% copper  
10% aluminum

This metal, when properly made, is non-corrosive and acid resistant. In conveying sulphuric acid, it can be used with the concentration of acid from 55 to 85 per cent, when the temperature does not exceed 80 to 90 deg. C.

One thing must be looked after if this alloy is used, that the casting is clean and free from any dross or dirt spots. Otherwise, the alloy is of no value. It is quite an art to produce aluminum bronze castings free from defects. However, it can be done by those skilled in the art, and when so done is the best cast bronze we know of at the present time. We would recommend such an alloy.

W. J. R.

**A. (2)**—From the information given it appears that some at least of the boxes which have been used have been castings rather than of sheet-metal construction. It is not quite clear whether castings must necessarily be used. Some of the metals which might prove satisfactory are not readily available in the form of castings.

Pure aluminum as a coating material has given excellent service in many tropical exposures. In the form of Alclad

it could be used in a box made from sheet duralumin upon which the aluminum has been rolled or sprayed. Even uncovered edges and rivet heads are protected by the proximity of the pure aluminum. An aluminum casting, made from any of the easily cast alloys, may be covered with pure aluminum by the Schoop-gun spraying process. The surface of the casting should first be roughened by sand-blasting to insure adherence of the coating.

Monel boxes would probably stand up well, either in sheet or cast form although a cast circuit box might be rather difficult to make.

Depending somewhat upon the actual conditions of exposure, the best solution might be the use of Everdur, a copper-manganese-silicon alloy, manufactured exclusively by the American Brass Company. This alloy can be obtained either in sheet or cast form. It casts rather well, and ingots for the purpose, already alloyed, are obtainable. Everdur resists most types of corrosion remarkably well and is extensively used for bolts, screws and other fastenings in ocean-going vessels.

H. M. ST. JOHN.

**A. (3)**—There are several possible materials that may be used in place of the types noted in your letter. I am sorry that you were not able to include some information concerning the general nature of the exposure in South America. I also noted that the alloys mentioned by you contained zinc. In many cases alloys made with zinc as an ingredient have been known to fail under severe moisture and heat conditions.

I have discussed this matter with several engineers in our organization and it has been suggested that heavily hot dip galvanized iron might prove more satisfactory than those alloys listed. It is also felt that a straight copper box might prove more satisfactory provided it has the necessary strength for the size of box listed by you. I am just wondering whether you have considered the stainless steel type such as Allegheny metal or K2 Enduro.

Aside from these suggestions, I cannot think of anything else at the moment with the limited amount of information which you had available.

W. G. K.

# The Preparation of Metals for Electroplating

**A Complete Schedule of the Practical Operations Involved,  
in the Cleaning of Metals of All Kinds, the Removal of  
All Types of Dirt, Oil and Grease Before Plating\***

**T**HE manufacture and recommendation of various types of cleaners for cleaning before electroplating is a science in itself. When a manufacturer of metal parts has a plating problem he will save much worry and waste by referring it to an experienced plater.

By the same token, the cleaner manufacturer is naturally much better equipped to solve the many details of the problems encountered in cleaning all types of metals.

## Selection of Cleaners

A few fundamentals of cleaner selection can be presented here for the guidance of the plater. The following factors must be thoroughly understood before the proper type of cleaner and proper concentration can be arrived at.

1. The nature of the oil, grease or dirt to be removed. Is the material of animal, vegetable or mineral origin? Does it contain insolubles such as are frequently found in stamping and buffing compounds?
2. What is the nature of the metal to be cleaned? Non-ferrous metals are readily tarnished by many types of alkali. Aluminum is blackened by any alkali that is not under complete control.
3. What is the degree of cleanliness required on the cleaned surface? Electroplating usually requires

\*Prepared by the technical staff of E. F. Houghton & Company, Philadelphia, Pa.

a chemically clean surface, although in some cleaning operations it may be desirable to leave a very slight film of oil or soap on the metal for temporary rust prevention.

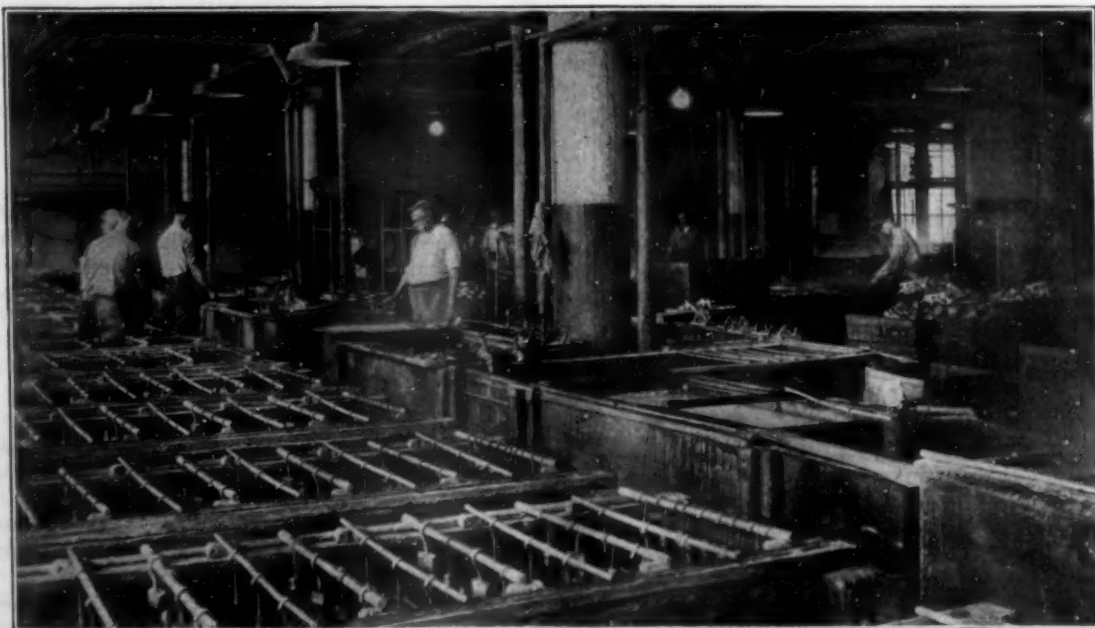
## Type of Material to Be Removed

The first and foremost factor in selecting the cleaning material is the nature of the oil, grease or dirt to be removed from the work. Mineral oils of all kinds can only be removed by **emulsification**, while animal and vegetable oils can only be removed by **saponification**, an entirely different process.

## Saponification

Saponification is a **chemical** process, in which the oil or grease is converted into a soap. In this form its adhesiveness is largely lost and it is readily washed and rinsed from the work. Mineral oil, however, cannot be saponified, and can only be removed by the **physical** action of emulsification in which the oil is broken up into very minute globules. In this form it naturally loses its adhesiveness and floats to the surface of the cleaning bath. Naturally these two operations require entirely different cleaners.

This explains why a cleaner may be very efficient on



**A WEL-EQUIPPED PLATING ROOM**

Plating tank in foreground and series of still and electric cleaning tanks in the immediate background.

a certain class of work and yet fail utterly on some other types of work due to the fact that the oil or grease to be removed is of an entirely different nature.

Saponification is usually accomplished by combinations of pure alkalis, while emulsification usually requires the presence of some sort of soap in the cleaner. An interesting exception to this rule may occur, however, in cleaning work which contains both mineral and animal or vegetable oils. If there is only a small quantity of mineral oil, very frequently the amount of soap formed by the saponification of the animal or vegetable oil may be sufficient to emulsify the mineral oil present. Thus a straight alkali cleaner may be used even though there is a percentage of mineral oil to be removed.

The condition of the oil also frequently affects the selection of cleaners. For instance, if the oil is dried on or baked on, or if it be of a very high viscosity or of a very adhesive nature, it is necessary that the cleaner have great "wetting out" ability in order to penetrate beneath the film and lift it from the work. Certain types of soap and also some sulphonated oils, when used in a small percentage in a cleaner, greatly increase its wetting out ability.

#### Nature of Metal to Be Cleaned—Iron and Steel

Iron and steel are not attacked by any of the ordinary alkaline or soap type cleaners used for cleaning before electroplating. However, it must be remembered that solder is readily attacked by many types of alkali, and may be blackened to such an extent that the subsequent plate will not adhere firmly. Ferrous parts which are soldered, therefore, require the same consideration in the selection of a cleaner as do non-ferrous metal parts.

#### Non-Ferrous Metals

All types of non-ferrous metals are subject to oxidation and attack by strongly alkaline cleaners, such as those containing a high percentage of caustic. Therefore, the milder forms of alkalis or controlled alkalis are usually used in compounding cleaners for non-ferrous metals.

It must be remembered, however, that the degree of attack is proportional not only to the strength of the free alkali but also to the length of time the parts are in the cleaning bath. Hence, if the oil or grease is quite difficult to remove, it is sometimes desirable to use a cleaner which would attack the metal if the parts remained in the solution too long, and then reduce the cleaning time to the point where the oil or grease is removed but the metal is not attacked.

#### Aluminum and Its Alloys

"Controlled" alkalis are frequently used in the composition of cleaners for non-ferrous metals and are absolutely necessary in a cleaner which is to be used on aluminum or its alloys. Any free alkali will oxidize and blacken pure aluminum or aluminum alloys. The oxidized film thus produced, naturally prevents a firm adhesion of the electroplate. It is only fair to state, however, that all controlled alkalis are somewhat slower in cleaning action than the usual forms of alkali and, therefore, must be used at somewhat higher concentration or the cleaning time must be increased in order to insure thorough cleaning. This slight disadvantage, however, is more than offset by the fact that they are absolutely foolproof. The proper type of controlled alkali will not cause the slightest degree of tarnish on pure aluminum regardless of the time, temperature or concentration at which it is used.

In cleaning aluminum and aluminum alloys, the tem-

perature of both the cleaning solution and the rinse tank must be watched, as boiling water will tarnish aluminum. Some types of these controlled alkalis, however, require boiling for at least 15 minutes in order to complete the chemical process which places the alkali under control. Hence, even though the solution may be used below boiling temperatures it should be boiled for this period of time when new cleaner is being dissolved or added for make up.

#### Rinsing After Cleaning

Any cleaner containing soap usually requires rinsing at from 180 to 212° F., in order to remove all traces of soap film from the surface of the work. Soaps of very low titer, however, can be rinsed at somewhat lower temperatures. It must be remembered, too, that even though the cleaner contains no soap, if the work contains any animal or vegetable oils or fats, these are saponified in the process of cleaning, and hence a hot rinse should be used to insure the removal of any soapy film which may be adhering to the work.

Great care is necessary in the rinsing of aluminum and some other non-ferrous metals in order to prevent water spotting. If two rinses are available, the first should be hot and the second, or final rinse, should be cold. If the work is hot rinsed and allowed to air dry, spotting occurs at the final point of evaporation. Of course, the best and surest method of avoiding water spotting is to dry the parts in sawdust immediately after rinsing.

#### Five Steps in Preparation of Metals for Electroplating

1. Oil, grease and fatty matter are removed from metal in tank solutions of the proper grade of alkaline or soap-type cleaner. Concentrations vary from two to six ounces per gallon. Solutions are operated with or without electric current.

2. Inert matter and insolubles such as insolubles of raw stamping compounds, abrasives in buffing and polishing compounds, carbon smut from cold-rolled steel and badly carbonized heat-treating oils are not completely removable in a platers' cleaner. They require hand brushing in a solvent preceding the platers' cleaner or hand brushing in the cleaning solution.

3. Rinsing off all traces of the platers' cleaner is necessary prior to pickling and plating operations.

The elimination of carryover into pickling and plating solutions lengthens the life of the pickle and does not contaminate plating solutions.

Rinsing of pickling acid is necessary prior to acid bath plating, and rinsing and neutralizing of pickling acid are necessary prior to alkali bath plating.

4. Oxides of metals must be completely removed prior to electroplating to produce high-grade work and protect plating solutions from contamination by oxides carried into them.

Sulphuric acid or muriatic acid at five per cent concentration is used for removal of oxides, rust and scale from ferrous metals.

Sodium cyanide or potassium cyanide is used for removal of light oxides and tarnish from non-ferrous metals.

Various combinations of sulphuric acid, nitric acid and muriatic acid are used for the removal of heavy oxides from non-ferrous metals. Sometimes this oxide removal is referred to as a "bright dip."

5. Pickling acid must be completely neutralized prior to electroplating metals in an alkali plating solution, so that the acid will not neutralize the alkaline solution and destroy its efficiency.

This article will be concluded in an early issue.—Ed.

# How Cadmium Resists Aqueous Solutions

By B. E. ROETHELI, C. J. FRANZ and B. L. McKUSICK

Massachusetts Institute of Technology, Cambridge, Mass.

## The Effect of pH on the Corrosion Products and Corrosion Rates of Cadmium in Oxygenated Aqueous Solutions\*

### Introduction

PROGRESS in the use of cadmium as a protective metallic coating for iron or other base metals has made it necessary for potential users of cadmium to become familiar with its corrosion resistant properties. Up to the present time very few data on the corrosion of cadmium have appeared in the literature. Rabald<sup>3</sup>, the compiler of corrosion data, in his monumental work lists only 32 references to the corrosion of cadmium. These, for the most part, deal only with very specific conditions of concentration, etc. and not with the variables which are deemed important by corrosion technologists; they do not provide therefore, good bases for predictions regarding the usefulness of cadmium under different conditions, and are of little use to the designer, manufacturer, or potential user of equipment in which the metal is used. Therefore, as a starting point, it was deemed of potential value to determine how the corrosion of cadmium is affected by the important variable, pH.

The pH of corroding media has become recognized as one of the most important of all variables affecting corrosion rates. Whitman<sup>5</sup>, Russell and Altieri shows how variations in pH in unagitated water markedly affect the corrosion of steel and iron. Forrest, Roetheli, and Brown<sup>1</sup> show pH to be an important factor in determining whether or not protective or non-protective films are precipitated on steel. Roetheli, Cox, and Littreal<sup>4</sup> have studied the effects of pH on the corrosion of the amphoteric metal, zinc and have shown that the formation of protective films is to a large extent governed by the pH of the solution in which the metal is immersed.

At times the pH of the solution also influences the potential of a cell of the type for which the summarizing reaction  $M + \frac{1}{2} O_2 + H_2O = M(OH)_2$  may be written. When films are present the overall potential remains unchanged since the concentrations of  $M^{++}$  and  $OH^-$  are always such that the solubility product of the solution  $M^{++}(OH^-)^2$  is exceeded. However, when the pH is sufficiently low and no films are formed, the potential set up will become higher and a greater solution tendency will result so that if the conductivity of the solution is sufficiently high, more current may flow and a greater quantity of metal may dissolve.

Since cadmium is a metal which has, in its film free state and in a molal solution, an electromotive force of 0.40 Volts<sup>2</sup>, i.e. a relatively high corrosion tendency, and since the solubility product of cadmic hydroxide is of the

order of magnitude of  $2 \times 10^{-14}$  the corrodibility of the metal will undoubtedly be affected by the pH of the oxygenated aqueous medium in which it is immersed. As in the case of zinc there must be a pH value below which solid corrosion products cannot exist and high corrosion rates may be expected. Since this pH value cannot be predicted directly from solubility and equilibrium data<sup>4</sup> it must be determined experimentally. Furthermore, as pH has been shown to influence the nature of the corrosion products formed in the case of the polyvalent iron<sup>1</sup>, films possessing different protective qualities might possibly be formed in the present case.

In view of the facts mentioned above an experimental method was devised by means of which the effect of pH

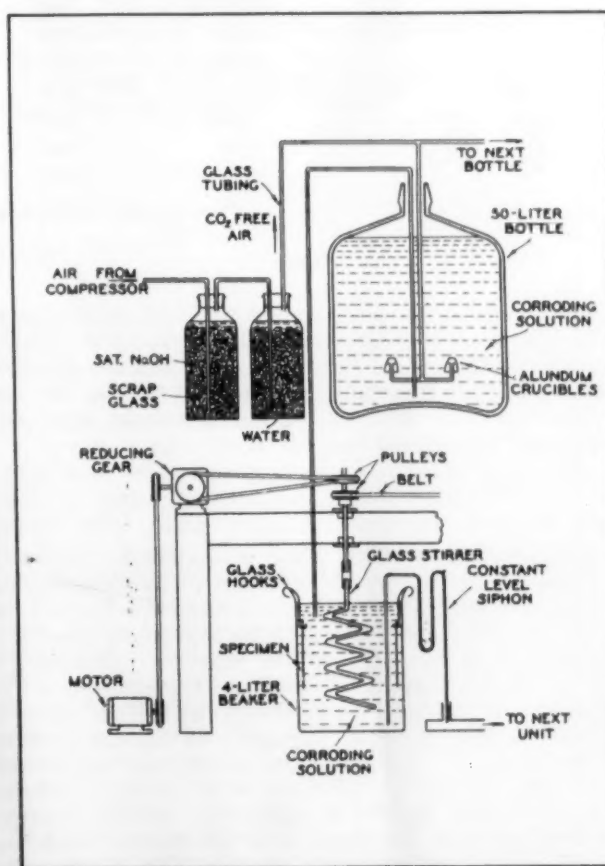


Fig. 1. Diagram of Apparatus.

\*A contribution from the Research Laboratory of Applied Chemistry of the Department of Chemical Engineering, Massachusetts Institute of Technology, Cambridge, Mass. Based on a thesis in partial fulfillment for a degree of Master of Science, 1931.

on the formation of corrosion products and on corrosion rates could be studied.

#### Experimental Methods

The apparatus used in this investigation was designed to permit cadmium specimens to be immersed in a continuously flowing, uniformly agitated, aerated, corroding medium of unchanging composition. A diagram of the apparatus is given in Figure 1. The method of operation is briefly as follows. A fifty liter carboy contained the corroding solution which was siphoned through a capillary into the beaker containing the stirrer at a rate of approximately 800 cubic centimeters per hour. The specimens,  $2" \times 4" \times \frac{1}{4}"$  were cast from bar cadmium of 99.9+ % purity and polished. They were then coated on one side and on the edges with paraffin, (leaving one face exposed) and suspended in the corroding medium for 7 to 41 days by means of glass hooks. The air temperature remained constant at  $74 \pm 1^\circ$  Fahr. The weights of the specimens before immersion and after removal of the corrosion products were determined, and the differences in weight converted to penetrations in inches per year.

During the course of the investigation pH measurements of the solutions were frequently made by means of the electrometric method. In order to check these values roughly, measurements were also made with various colorimetric indicators. The solutions used and their corresponding pH values in the test beakers were as follows:

	Normality	pH in Beaker
HCl	1.50	-0.04
	1.00	0.10
	0.10	1.02
	0.01	1.93
	0.001	4.24
Water		5.29
NaOH	0.0001	8.07
	0.01	11.65
	0.10	12.69
	1.00	13.54

#### Results

The results of this investigation are indicated graphically by Figure 2, in which the ordinates represent average overall penetrations in inches per year and the abscissas represent the pH values of the solutions in the test beakers. Photographs of the test specimens after corrosion are reproduced in Plate I.

#### Discussion

An examination of the curve in Figure 2 shows that it is inadvisable to subject cadmium to solutions having pH values below 5.29 since in the solutions of low pH the corrosion rates are high and approximately inversely proportional to the pH's of the solution. However, it may be used satisfactorily at all pH's greater than this value if a negligible rate of dissolution of the metal is the only feature desired. In cases where a discoloration of the surface is undesirable no satisfactory results will be obtained by the use of cadmium, since visible colored films of various degrees of uniformity and compactness are obtained in all the oxygenated solutions in which low corrosion rates predominate. The variability of the color of films is indicated by the photographs in Plate I. For pH's of 5.39 or greater, uniform films were obtained and

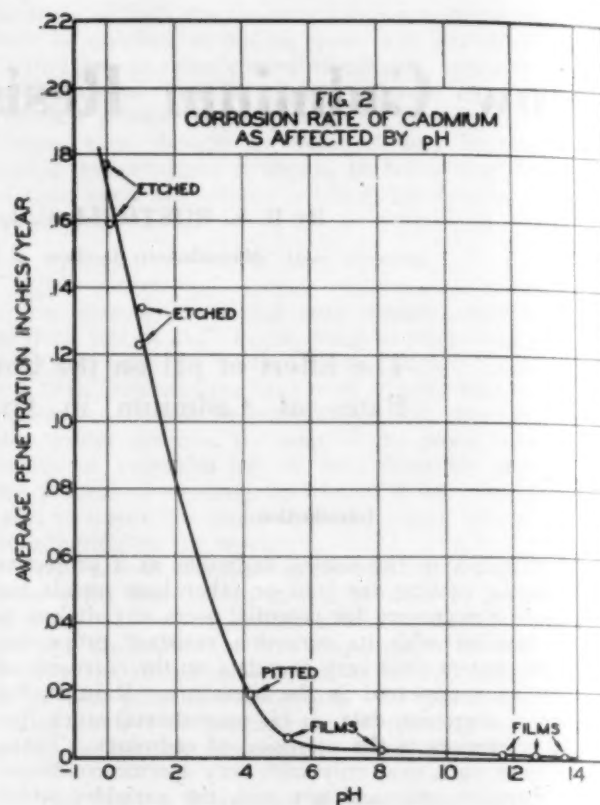


Fig. 2. Chart of Results.

differently colored corrosion products were obtained in each case. The colorations resulting were as follows:

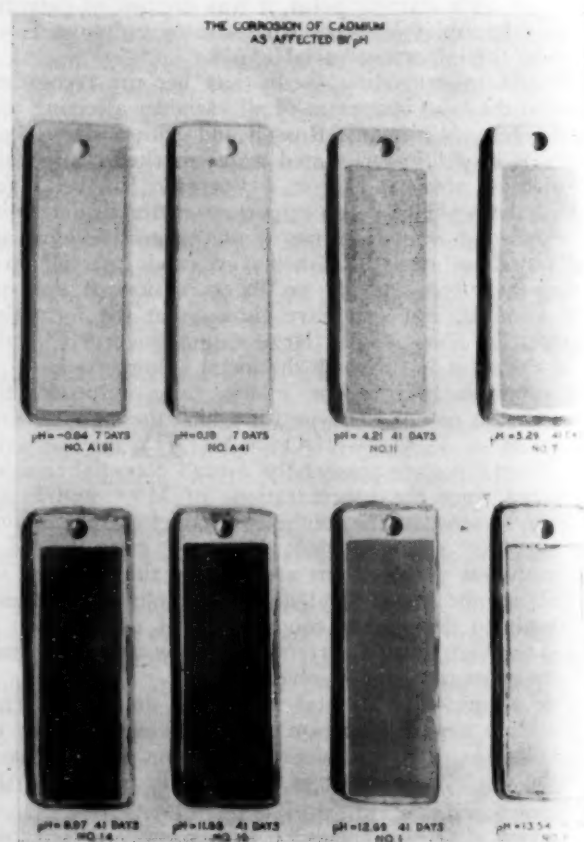


Fig. 3. Effect of pH on Specimens.

pH	Color
5.29.....	Silver grey
8.07.....	Bluish grey
11.66.....	Slate
12.67.....	Olive grey
13.54.....	Greyish white

The literature is of little assistance in showing why such an extensive variation in film colors exists, except for the fact that numerous differently colored oxides and hydroxides are reported. If it is recalled that the nature of the films formed in the corrosion of the polyvalent metal iron depends upon the pH<sup>1</sup>, a similar explanation may be possible here. But since data on solubilities of the various oxides and hydroxides are not available little can be said at this point regarding the manner of formation of the corrosion products. Gregory and Burr<sup>2</sup> list the following oxides and hydroxides of cadmium:

CdO—Crystalline—black shining octahedra amorphous—cinnamon brown.

Cd<sub>2</sub>O—Crystalline — yellow amorphous — green powder.

CdOH—Amorphous—Greyish white.

Cd(OH)<sub>2</sub>—Amorphous—white.

It seems, therefore, that the corrosion products obtained are probably mixtures of two or more of the constituents named above. A microscopic examination of the corrosion products showed them to be uniform in appearance, but no clue was given as regards their crystalline or amorphous states.

In solutions whose pH's are low enough to prevent the formation of films, etched, film-free surfaces resulted and the corrosion rates found were apparently unaffected by the size of the grains in the metal.\*

While the results of this investigation point to a film dissolving range of pH below 5.29, different values may be obtained if other conditions such as turbulence, temperature, etc., which tend to alter the corrosion rates and

\*Two specimens in which the grain sizes differed materially were immersed in two solutions whose pH values were the same and no differences in the corrosion rates were noted.

the OH<sup>-</sup> diffusion gradient from the metal surface to the main body of the solution, were varied at any definite pH. In view of these possibilities it would seem that a higher minimum pH value should be taken as a safe value when the recommendation of cadmium for use in the manufacture of equipment is being considered. It is therefore proposed that in order to allow for possible variations from the experimental conditions of this investigation, a minimum pH of 6 be adopted instead of 5.29 as determined in these experiments.

#### Conclusions

1. Under the conditions of the investigation, at pH's below 5.29 the corrosion rate of cadmium in oxygenated aqueous solutions is approximately inversely proportional to the pH.
2. Allowing for possible variations in conditions, the probable safe minimum pH in oxygenated solutions in which cadmium is to be immersed is 6.
3. At pH's greater than 5.29 colored corrosion products, which are probably homogeneous mixtures of oxides or hydroxides of cadmium of varying degrees of compactness, are formed in oxygenated solutions.
4. The use of cadmium in oxygenated solutions having pH's greater than 5.29 will naturally be limited to cases in which discoloration is unimportant.

#### Literature Cited

- <sup>1</sup> Forrest, H. O., Roetheli, B. E., and Brown, R. H. J. Ind. Eng. Chem. 22, page 1197, (1930).
- <sup>2</sup> Gregory, J. C. and Burr, M. S. Textbook of Inorganic Chemistry, Vol. 3, Part 2.
- <sup>3</sup> Rabald, E. Werkstoffe und Korrosion, Verlag Spamer, Leipzig, 1931, page 285.
- <sup>4</sup> Roetheli, B. E., Cox, G. L., and Littreal, W. B. Metals and Alloys, 3, page 73, (1932).
- <sup>5</sup> Whitman, W. G., Russell, R. P., and Altieri, J. Ind. Eng. Chem. 16, page 665, (1924).

## Zinc Coated Rivet Heads

A NOVEL method of protecting rivet-heads from corrosion has recently been developed (U. S. Pat. 1,867,736) which offers interesting possibilities for large new uses of hot-dipped galvanized structural steel.

The use of zinc-coated, or galvanized members in steel construction has thus far been restricted to comparatively light, bolted structures, wherein the individual angles, channels, plates and other units are first hot-dip galvanized and then fastened together with galvanized bolts and nuts. Hot-dipped galvanized steel has also long been recognized as a most desirable material for the heavier types of steel construction, owing to the excellent weather-resisting properties afforded by the extremely heavy coating of zinc which such material always carries.

These heavier structures are usually riveted together, and because of the difficulty of protecting the bare rivet-heads against corrosion, galvanized steel has seldom been used.

Galvanizing of such structures after assembly is usually impossible, also, because of their extreme size and awkward shape—a further difficulty being that the mem-

bers are in such close contact at the joints as to prevent the removal of oxide scale and the proper zinc coating of the steel surfaces at these points.

A method has now been provided whereby the individual units of riveted steel structures may be hot-dip galvanized before assembling, joined together by riveting in the usual manner (using the ordinary uncoated rivets), and the exposed, rivet-heads then sealed off from the weather after the entire job is assembled in the field.

This method employs a circular flanged cap, formed from heavy gauge rolled zinc, which fits snugly over the rivet-head. This cap is fastened to the galvanized surface of the structural shape through which the rivet passes, by means of a continuous ring of solder, thus completely sealing off the rivet-head from the atmosphere. Application is by means of a gas or electrically heated, specially shaped soldering iron, so designed that the cap may be attached regardless of the position of the rivet. The caps are designed to fit various shapes and sizes of rivet-heads, with a heavy ring of solder already attached to the under side of the cap flange.

# What Is Wrong With the Brass Foundry Industry?

By WILLIAM E. PAULSON

Thomas Paulson & Son, Inc., Brooklyn, N. Y.

THE METAL INDUSTRY Editorial entitled "The Brass Foundry Needs New Spark Plugs," has excited the writer to an effort to answer his own questions—the title of this article.

Just now the "Big Thing" that is wrong with our industry is, of course, the depression. Owing to the dearth of business, the too numerous foundries stampede for such orders as exist and permit the buyers to name prices regardless of costs. Now the ignorant competitor is easy prey for the "clever" buyer and the dishonest competitor seems easy. The shops that are endeavoring to do business on a basis that will enable them to pay all expenses and remain solvent are in a "hot spot."

They have no reserve funds available for research or publicity and those companies which are backed by big money are able to spread their propaganda all over the printed page, telling users in effect, that sand castings are relics of the dark ages and therefore inferior to stampings, die castings, rolled and forged shapes, etc.

Well, the sand casting art does date from the dark ages and this art has made all the other technical developments possible.

Stampings, die castings, forging, etc., do frequently take the place of sand castings and are sometimes as good and occasionally better. Not infrequently, however, they are much inferior, a fact that the buyer discovers after use has proven their shortcomings.

## Sand Castings a Necessity

The aforementioned substitutes for sand castings can be dispensed with but the sand castings cannot be set aside and will always be necessary. Let the sand caster take some comfort from this consoling thought.

It is too true that some spectacular development in the sand casting art would do much to advance this industry. As suggested, something with a popular appeal would be a great stimulus to our trade.

Chromium plating was a revolutionary development and has done much to advance this branch of the metal trades. Everybody recognizes a chromium plated radiator on an automobile. It is difficult to get a look at a cast aluminum piston inside of an automobile engine. The car will function without chromium on the radiator, but it is just useless without that piston. And this sort of comparison can be extended to dozens of parts made as castings, with the latter found indispensable.

It would seem to the writer that the spectacular does not hold much encouragement for the future of the sand casting art. Like the foundation of a wonderful structure, the casting cannot be seen.

We foundrymen must cease retiring with our tails between our legs, when buyers tell us about casting substitutes. Such an attitude on our part is one of the big things wrong with this basic industry.

## Mechanical Properties of White-Metal Bearing Alloys at Different Temperatures

THE usual white-metal bearing alloys require tin or antimony or both as essential constituents. Both tin and antimony are so-called "strategic" metals and the potential military demands for these metals are considerable. These facts were responsible for the sponsoring by the War Department of recent studies at the United States Bureau of Standards aimed toward the reduction or possible elimination of the amounts of tin and antimony needed for bearings.

One phase of this work was a study of the wear resistance and other mechanical properties of 10 white-metal bearing alloys. The alloys tested included 2 tin-base and 7 lead-base alloys and 1 alloy of cadmium and zinc.

Each of the properties, with the exception of wear, was determined at several temperatures ranging from 20° to 200° C. (68° to 390° F.), since it is in reality the properties at the higher temperatures that play the major part in determining the success or failure of a bearing metal under service conditions. Resistance to wear was determined only at 20° C. No one of the alloys con-

sidered was found to excel in all of the mechanical properties studied. Thus, the tin-base alloys showed higher resistance to wear and in most cases had higher Izod impact values, at each temperature of test, than the lead-base alloys, but in most cases showed lower resistance to pounding than the lead-base and cadmium-zinc alloys. The hardness numbers and compressive properties of the tin-base alloys were found to be lower than those for the alkaline-metal hardened lead and the cadmium-zinc alloys. The alkaline metals used for hardening lead were calcium and barium. The mechanical properties of the lead-antimony-tin alloys, in most cases, were higher as the tin content was increased.

Crankshaft bearings of four compositions were prepared for service tests in United States Army class B trucks. These compositions consisted of two tin-base and two lead-base alloys. The results of these tests indicated that the tin-base alloys were superior in their wear resistance to the lead-base alloys. These results were consistent with those obtained on wear in the laboratory tests.

## Rockefeller Center—A Mammoth Building Project Which Will Require Millions of Pounds of Metals

**T**HE largest private enterprise ever undertaken at one time by man is the Rockefeller Center, now under construction on twelve acres of ground bounded by Fifth and Sixth Avenues and 48th and 51st Streets, in New York City.



The Latest Architect's Picture of Rockefeller Center, Now Under Construction in New York. It is the World's Largest Building Project. According to Present Plans, It Will Include Eleven Buildings Which, with Their Related Open Spaces, Will Cover Nearly Twelve Acres of Land.

### Copper-Sheathed Building

**C**OPENHAGEN, Denmark, has the world's largest commercial building entirely surfaced with metal. "Vesterport," which occupies an entire block, is the seven-story structure shown at right. Its whole exterior surfaces are sheathed with copper. The framework is steel. The walls, mainly of light concrete work, with some light brick work, are backing for the copper sheets with which the building is encased.



Photo Copper and Brass Research Association

Naturally, metals will assume a highly important role in the immense project. While the exact statistics are not available as to the materials which will go into the whole structure, the list which follows gives some idea of the scale on which non-ferrous metals are being used. The "estimated total" column indicates the quantities expected to be required for the whole Rockefeller City, while the "present buildings" column represents what has already been used, with the project as yet incomplete.

#### Nonferrous Metals in Rockefeller Center

	Estimated Total		Present Buildings	
	Quantity	Tons	Quantity	Tons
<b>Aluminum</b>				
Spandrels and sub-sills	15,000	1,005	7,750	522
<b>Brass Pipe</b>				
Plumbing, heating and ventilating	300,000 ft.	700	145,000 LF	350
<b>Copper Radiation</b>	450,000 sq. ft.	75	220,000 SF	36
<b>Copper Sheets</b>				
Roofing, flashing, etc.		150		75
<b>Copper Wire and Cables</b>				
Light and power systems, elevators, telephones, etc.	2,400 mi.	1,300	1,182 mi.	693
<b>Lead Pipe</b>				
Plumbing connections, etc.	10,000 ft.	30	5,000	15
Total tons		3,260		1,691

## EDITORIALS

### Business Upturn

The remarkably rapid and well sustained rise in prices of stocks during the past month has created a very much better sentiment throughout business circles. Along with it, however, is a feeling of wonder and perplexity. Is business really rising? That can be answered definitely—no. Is business about to rise? There are reports of improvement in some circles, but most of the large basic industries of the United States are still operating at a rate far below what are considered normal. Favorable aspects are the improvement in prices of several raw materials and the consequent improvement in their related industries. Unfavorable aspects are the lagging behind of most of our large groups and the continued decline of index numbers for business as a whole.

It should be stated in addition, however, that the most favorable sign—although perhaps not the most conclusive—is the improved sentiment and increased confidence which undoubtedly does exist.

In this situation as in all others, opinions of leaders are eagerly sought. It is noticeable that expressions of extreme optimism from the captains of American industry are lacking. Col. Ayres expresses cautiously the belief that a business revival is not far ahead. Robert P. Lamont says that he does not think the advance in security markets would have gone so far unless there had been something real behind it. He hopes that the upturn in the security markets and business will not be too speedy. Throughout the more careful commentators in the business and daily press there runs the same note of conservatism, reflected by such statements as:

"Sporadic cases of resumed plant activities are featured in the daily press but do not tell the whole story, since offsetting recessions in activity elsewhere are not brought to light until the detailed over-all monthly figures are obtained. The offs must be counted with the ons to get a true picture. . . . It would indeed be a pity if this very real hope were turned into skepticism by the hitching of too many band wagons in the endeavor to help things along."

In our own summary of conditions in the non-ferrous industries, published in this issue, we find that

"There are scattering indications of business improvement. It is possible that we have reached bottom and are now on the way out. Even if this should be true, however, it is far from certain that our troubles are over."

In times like these the most important element to be preserved is courage. But close behind are common sense and caution. This is perhaps too much to ask of the stock market but we must in all earnestness impress it upon our readers who are engaged in industry, and not in speculation.

### Corrosion Testing Program

An elaborate and comprehensive testing program for studying the corrosion of non-ferrous metals and alloys is now being carried out by Committee B 3 of the American Society for Testing Materials. It has been in operation for the past five years and is scheduled to run for a total of about twenty-five years more. About 23,000 specimens are being used covering 24 different metals and alloys. The amount of corrosion undergone will be measured by determining the change in weight of plate specimens and determining the loss in strength and ductility by means of tension tests. In addition, the Division of Metallurgy of the United States Bureau of Standards is making an investigation of the films of corrosion products which form on various metals and alloys.

In selecting locations for the exposure tests, efforts were made to secure a wide variety of atmospheric conditions, which at the same time would be fairly representative of the atmospheres in which the metals and alloys included in these tests are used in large percentages.

As a part of the general corrosion program of Committee B 3, Sub-Committee 7 on Liquid Corrosion is obtaining data and information on the resistance of representative metals to a few common solutions. Twenty-two different metals are being tested by immersion of solutions in sulphuric acid, hydrochloric acid, caustic soda and common salt. The inquiry is limited, however, by the fact that every metal is not being tested against every corrosive.

Sub-Committee 8 has a program, testing against the galvanic and electrolytic corrosion, which includes outdoor exposure tests, at 9 locations, of galvanic couples of metals in common use and complete immersion couple tests of certain metals and alloys in hot water, brine, alkali and acid. Couple combinations have been made of aluminum, copper, mild steel, tin, zinc, nickel and lead.

The scope of this program is tremendous and its undertaking is obviously expensive. It is made necessary by the experience of the Society in working with accelerated laboratory tests. They find it still a fact that accelerated corrosion tests are far from satisfactory. According to their statement, "general experience teaches that it is very difficult to establish and control the conditions of tests so that a parallelism exists with a particular type of service. Too many people try to find out what will make a good condenser tube, for example, by hanging samples from a dock, or what will make a good roof material by immersing samples in an acid solution in a laboratory beaker."

So we are forced to go through the long and expensive procedure of outdoor testing. The field is still wide open for reliable accelerated corrosion tests.

## Silver Consumption

The trend of the use of silver in the past two years has been extremely interesting to watch. A valuable summary on this subject has been issued by the U. S. Bureau of Mines entitled, "Silver Consumption in the Arts and Industries of the United States in 1930 and 1931" which gives an excellent birdseye view of the situation.

It seems that the consumption of silver in American arts and industries during the past two years has remained remarkably near the high level established in 1929. Reasons for this condition are numerous. Of course, the low price of silver is perhaps the most important, but the fact is that silver has peculiar and valuable properties which have been brought to the attention of both the consuming and manufacturing public.

The total consumption of silver in 1931 was about 23,600,000 ounces compared with about 24,000,000 in 1930, 28,600,000 in 1929 and 25,800,000 in 1928. The sterling silver industry took the largest proportion of silver, as usual, absorbing 36.4 per cent. Photography was next with 25.4 per cent. Others were electroplating, 14.9 per cent; jewelry, optical goods and novelties, 8.6 per cent; chemicals (outside of photography and electroplating) 6 per cent; industrial uses, including silver solder, 6.6 per cent; and dental supplies, 1.9 per cent.

A noteworthy point is that Sterling silver increased its taking of pure silver from about 7,550,000 ounces in 1930 to 8,825,000 ounces in 1931—a marked recovery during a general period of recession—due largely to the lower price of silver which made possible the lowest retail prices for Sterling silverware ever quoted. However, it must be remembered that other metals have also gone to new lows in their prices and still their consumption has not increased during the same period.

The electroplating industry showed a sharper decline in silver consumption for 1930 and 1931 than any other important silver using industry, falling off from 4,100,000 ounces in 1929 to 2,780,000 in 1930 and 2,310,000 ounces in 1931. Plated silver undoubtedly suffered from the lowered prices of Sterling on one hand and the attack of poor quality, light-weight plated silver on the other.

Jewelry, optical goods and novelties, fell off 15 per cent in silver consumption between 1930 and 1929, but the 1931 figures fell no further, giving indication that the bottom had been practically reached. Industrial uses of silver including solders actually rose between 1930 and 1931 from about 1,150,000 to 1,225,000. Silver solder seems to have a very interesting future.

Silver will not always stay down at the bottom in price any more than any other material, but even if it should rise much higher than at present, it seems very unlikely that some of the new fields which it has won will not be permanently occupied. The regret is they are so few.

## Bearing Metals

One of the oldest branches of industrial metallurgy is the manufacture of metals for bearings. It had its origin in the discovery by Isaac Babbitt in 1839 of a tin base alloy containing copper and antimony which had remarkable properties as a special metal lining to withstand friction without over-heating. The principle which he discovered is now the basis of a very large industry engaged in by hundreds of firms, small and large.

A surprisingly large proportion of those manufacturing bearing metals are unacquainted with the fundamentals involved in the choice of metals to use in such mixtures. A bearing metal, according to C. H. Bierbaum, in a paper recently delivered before a Conference on Metals and

Alloys in Cleveland, is an alloy that is capable of retaining a lubricant upon a bearing surface. This property is obtainable only by the formation of a mixture of metals so that the resultant mixture consists of hard and relatively soft microscopic particles intimately mixed. The hardest crystals in the bearing metal should not be hard enough to prove distinctly abrasive to the journal and the softest crystals should not be soft enough to flow or become distorted under the requirements of pressure and temperature. For the best surface conditions, therefore, it is essential that the journal (the shaft) should have a high degree of homogeneity and on the contrary, the bearing metal, a high degree of heterogeneity.

It seems that during the past few decades, individuals, corporations and research institutions have done an enormous amount of work in studying and testing bearings. According to Mr. Bierbaum the positive information obtained has been small because the investigators have been trying to determine actual bearing value by means of a test of a few years' duration. According to an old report of the Sub-Committee on Bearing Metals of the A.S.M.E., it is exceedingly improbable that laboratory accelerated surface tests can ever give general satisfaction, owing to the difficulty of reproducing in a few hours' time the equivalent of many years of service conditions.

Several interesting improvements have been made in bearings in recent years. It is the introduction of nickel into a copper-tin alloy forming a nickel phosphor bronze. Another is the use of nitrided nitralloy and chromium plate in the journals.

It must be borne in mind constantly that the manufacture of bearing metals is deceptively simple in appearance. Too many mixtures have been placed on the market, developed and compounded by amateurs. It is a tremendous field which should be undertaken and carried on only by those who have a thorough understanding of the metallurgical and mechanical principles involved.

## A Meritorious Project

We have recently had the pleasure of receiving an interesting and heartening communication from the American Institute of Architects telling about a nation-wide movement to bring to the attention of state legislatures the possibilities in low cost housing and slum clearance which exist, using Federal funds under the Emergency Relief and Construction Act of 1932. Restrained by fears of taxpayers' revolts, states and cities, it is charged, are failing to respond to the urgent necessity for starting work which will increase employment, and improve city areas that are now a social menace. Taxation, it is stated, is not a factor as loans can be obtained from the Reconstruction Finance Corporation for self-liquidating enterprises. Housing is clearly a self-liquidating type of construction and should have no difficulty in obtaining the funds required.

According to Robert D. Kolm, past president of the Institute, the difficulty is the prevalent state of mind, (perhaps justified in many ways) against expenditures wherever they can be avoided. Elected officials have been told pointedly that their political life depends upon their care in conserving public funds, reducing expenditures and lowering the costs of Government. It is important, however, and should be made clear that projects of this type do not involve increases in taxation. The Reconstruction Finance Corporation has funds available for projects which will pay for themselves.

There is no type of undertaking more praiseworthy than building from a social point of view or more productive in terms of employment and circulation of money into other industries. We wish the Institute of Architects well,

## Technical Papers

**Some Important Factors Controlling the Crystal Macrostructure of Copper Wire Bars;** by L. H. DeWald. American Institute of Mining and Metallurgical Engineers, 29 West 39th Street, New York. Technical Publication No. 429, Class E, Institute of Metals Division, No. 152.

**Adhesion of Electrodeposited Nickel to Brass,** by A. W. Hotherhall. Electroplaters' and Depositors' Technical Society, Northampton Polytechnic Institute, London, E. C. 1, England.

**SUMMARY AND CONCLUSIONS:** The nature and degree of adhesion of electrodeposited nickel obtainable to brass surfaces cleaned by methods not involving etching have been studied, and the degree of adhesion has been found to vary according to the nature of the brass surface. Thus, whilst a relatively high adhesion was obtained to filed or machined brass, only a slight degree of adhesion (such that the deposit could be pulled off with the fingers) was found in the case of emiered brass. The results obtained by the tests applied do not, however, indicate the true adhesion as the test pieces invariably failed in the surface layers of the brass and not at the deposit/brass interface. In the majority of cases, heat treatment of the nickel-coated specimens at 250° C. for two hours was found to improve very considerably the degree of adhesion of nickel deposits to surfaces not subjected to etching during cleaning, and a similar improvement in adhesion was generally obtained by the preliminary deposition of a layer of copper from the acid sulphate solution followed by deposition of nickel. By these methods fairly strongly adherent deposits could be formed on emiered brass, and with their use the effect of progressive etching of an emiered surface was studied. The degree of adhesion was found to increase gradually with the degree of etching, and it is concluded from this and from the results referred to above that the poor adhesion of electrodeposited nickel which is obtained on unetched emiered brass is due partly to embrittlement of the surface layers by adsorption of hydrogen and partly to the inherently weak condition produced by the emery treatment.

In the case of buffed brass, it has been found that the material which is particularly weak inherently, and which is principally susceptible to hydrogen embrittlement, is confined to an extremely thin surface skin, probably less than 0.0005 mm. in thickness, and that removal of this skin by means of suitable etching treatment before deposition of nickel results in the production of adherent deposits. Etching by means of nitric acid or mixtures containing nitric acid has been found to be undesirable, as the process cannot be satisfactorily controlled. Anodic etching in a suitable solution, however, affords a means whereby polished brass surfaces may be sufficiently etched to ensure the production of adherent nickel deposits without noticeably dimming the lustre.

Two solutions have been used for the anodic etching of brass—a potassium cyanide solution, and a solution containing citric acid and ammonium citrate. Treatment of buffed brass at 10 amps. per sq. foot for about half a minute has been found to be sufficient to ensure the production of highly adherent nickel deposits on a number of different types of brass without appreciably affecting the polished appearance.

**Cathode Sputtering,** by Hal F. Fruth, Western Electric Company, Inc. Metallurgy Monograph B-662, Bell Telephone Laboratories, Inc., 463 West Street, New York.

An explanation of the cathode sputtering process for electrostatic deposition of metals, and a description of a commercial application.

**Progress at Mellon Institute During 1931-32.** Abstract from 19th annual report of the director to the trustees, reprinted from Industrial and Engineering Chemistry. American Chemical Society, New York.

**Relative Wear of Metals Due to Abrasion,** by Charles R. Weiss. Link-Belt Company, Indianapolis, Ind.

**Beryllium, a Bibliography,** by Mary E. Hoyt and Karl Von Den Steinen. School of Mines, Golden, Colo. Quarterly, Vol. XXVI, No. 4. Price 25 cents.

**Nickel Bronzes.** Published in the Nickel Bulletin, issued by the Mond Nickel Company, Ltd., London, England.

This article gives a broad outline of the properties and applications of bronzes containing nickel, and indicates the wide scope of these alloys. They may be considered as a range of materials having a structure similar to bearing bronzes, but with proportions of copper replaced by nickel. By such replacement, these bronzes are rendered more resistant to corrosive media and their wearing properties are considerably improved, while low coefficients of friction are obtainable. They have the further advantage of being applicable to service at somewhat elevated temperatures and in places where lubrication is not practicable.

**Lead in 1930,** by E. W. Pehrson, Bureau of Mines. General Report. 5 cents.

**Effect of Antimony on the Mechanical Properties of a Bearing Bronze (Cu 80 : Sn 10 : Pb 10),** by C. E. Eggen-schwiler, Bureau of Standards. Research Paper No. 442, available from Superintendent of Documents, Washington, D. C.

**Standard Punch and Die Sets.** Proposed American standard, developed by Technical Committee No. 9, American Society of Mechanical Engineers, C. B. LePage, assistant secretary, 29 West 39th Street, New York City. Available on request. Criticism and comment of the industry is invited.

**Magnesium.** Research Narratives, Vol. 12, No. 12. The Engineering Foundation, 29 West 39th Street, New York City. Leaflet.

**Safety Code for Protection of Workers in Foundries.** American Standards Association, 29 West 39th Street, New York City. No. B8-1932, a revision of the code developed under sponsorship of American Foundrymen's Association and National Founders' Association. Price, 20 cents.

**Heating, Piping and Ventilating Where Requirements Are Severe,** by Junius D. Edwards, assistant director of research, Aluminum Company of America, New Kensington, Pa. An article in July issue of "Heating, Piping and Air Conditioning," 1900 Prairie Avenue, Chicago, Ill.

**The Nickel Bulletin.** The Bureau of Information on Nickel, Thames House, Millbank, London, S.W.1, England. Vol. 5, No. 7. Free.

**Chemical Resistance of Rubber as an Engineering Material,** by H. E. Fritz and J. R. Hoover, manager and assistant manager, respectively, of the chemical sales division, The B. F. Goodrich Company, Akron, Ohio. Published by American Society for Testing Materials, Philadelphia, Pa. 17 pages.

## Government Publications

United States Government publications are available from the Superintendent of Documents, Government Printing Office, Washington, D. C., to whom proper remittance should be made to cover price where a charge is mentioned. In some cases, as indicated, applications should be made to the governmental body responsible for the publication.

**Statistical Surveys of Department of Commerce.** Advance summaries available from Department on Aluminum Industry in 1931; Platinum and Allied Metals in 1931.

**Zinc in 1930,** by Elmer W. Pehrson, Bureau of Mines. General Report. Price, 5 cents; sold by Superintendent of Documents.

# Shop Problems

This Department Will Answer Questions Relating to Shop Practice.

## ASSOCIATE EDITORS

### Metallurgical, Foundry, Rolling Mill, Mechanical

H. M. ST. JOHN  
W. J. REARDON

W. J. PETTIS  
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### Electroplating, Polishing, and Metal Finishing

O. J. SIZELOVE  
G. B. HOGABOOM

A. K. GRAHAM, Ph.D.  
WALTER FRAINE

## Analyses

Q.—We are sending you under separate cover samples of our nickel, silver and brass solutions. We have considerable trouble with our silver peeling. Before silver plating we usually give a coat of nickel, but we find that when silver plating on the nickel, both nickel and silver chip off.

The brass solution we are sending you for an analysis. Kindly let us know what we can do to make our brass brighter. There must be something lacking, as we plate white metal, which consists of lead and antimony, and find that we have to leave the work in the brass solution at least 40 minutes before we are able to oxidize and relieve it.

### A.—Analysis of nickel solution:

Metallic nickel .....	2.01 oz.
Chlorides .....	6.95 oz.
pH .....	6.4

Both the chloride content and the pH are too high. To correct the pH it will be necessary to add to each 100 gallons of solution 6 fluid ounces of sulphuric acid. The only way to reduce the chloride content is to dilute the solution. After making the addition of the acid, if trouble is still encountered discard one-half of the solution and add 8 ounces of single nickel salts to each gallon of solution.

### Analysis of silver solution:

Metallic silver .....	1.65 oz.
Free cyanide .....	1.92 oz.

Add one ounce of silver cyanide and 3 ounces of sodium cyanide to each gallon of solution.

### Analysis of brass solution:

Metallic copper .....	4.74 oz.
Metallic zinc .....	1.04 oz.
Free cyanide .....	4.98 oz.

The brass solution is too concentrated for good operating condition. Take one-half of the solution from the tank and then replenish with water to the previous level.

For a brightener in the brass solution dissolve 1 pound of white arsenic and 2 pounds of caustic soda in one gallon of water. Use one to two ounces of this solution for each 100 gallons of solution.

O. J. S., Problem 5,122.

## Cleaning Vitrified Fixtures

Q.—With your knowledge of plating and metallurgy, perhaps you can tell me how I can remove nitrate of silver stain from vitrified plumbing fixtures.

A.—A dilute solution of nitric acid is suggested to remove the stains. One part of acid and four parts of water should be strong enough, but if the stains are very heavy it may be necessary to use more acid.

O. J. S., Problem 5,123.

## USE THIS BLANK FOR SOLUTION ANALYSIS INFORMATION

Fill in all blanks if possible.

Date .....

Name and address: ..... Employed by: .....  
 Kind of solution: ..... Volume used: .....  
 Tank length: ..... width: ..... Solution depth: .....  
 Anode surface, sq. ft.: ..... Cathode surface, sq. ft.: .....  
 Distance between anode and cathode: ..... Kind of anodes: .....  
 Class of work being plated: ..... Original formula of solution: .....  
 REMARKS: Describe trouble completely. Give cleaning methods employed. Send small sample of work showing defect if possible. Use separate sheet if necessary.

NOTE: Before taking sample of solution, bring it to proper operating level with water; stir thoroughly; take sample in 2 or 3 oz. clean bottle; label bottle with name of solution and name of sender. PACK IT PROPERLY and mail to METAL INDUSTRY, 116 John Street, New York City.

### Bronze Finish for Lead

Q.—I am interested in a novelty manufactured from lead and believe that its value can be enhanced by giving it an old bronze finish.

I am a metallurgist but unacquainted with metal finishes, and it has occurred to me that perhaps you could give me the necessary information to develop various finishes on a lead article.

A.—There are two ways of producing an old bronze finish on lead articles. One is the use of lacquer enamels, the other is by the electroplating process. In producing a plated finish the usual procedure is to copper plate, polish or brighten, and brass plate. The brass plate should be quite heavy. Two solutions are necessary to produce the bronze finish, a sulphur solution made by using one ounce of sulphur to one gallon of water, and an acid solution made of one ounce sulphuric acid, one ounce nitric acid and one gallon water. The procedure is to immerse the work in the sulphur solution and then in the acid solution, repeating the operation until the desired shade of color is obtained. The finish is made uniform by scratchbrushing dry, using a fine crimped nickel silver wire wheel operated at 800 R.P.M. The finish must be lacquered to preserve it.

For the lacquer enamel finish consult the "Buyers' Guide" pages. O. J. S., Problem 5,124.

### Etched Bronze

Q.—Enclosed find sample piece of etched bronze. We would like to know the solution for etching bronze to produce the smooth finish on sample.

Do you think it has been given a treatment to produce light color after it has been etched to keep it from tarnishing?

A.—The sample has been etched with a perchloride of iron solution. This material can be purchased ready for use. It should have a specific gravity of 1.142. A smooth even etch will be obtained if the solution or the work is agitated.

The sample has been sprayed with a lacquer to prevent tarnishing. O. J. S., Problem 5,125.

### High Grade Abrasives

Q.—Enclosed find two samples of abrasives and one of polish (red oxide of iron). These materials are specially prepared to insure uniform fineness. Your comment on the samples would be greatly appreciated.

A.—The samples of abrasives and polish are of a very fine grade of material, but we doubt very much that there would be a field for their use in the finishing of metals due to the prices that you have quoted. O. J. S., Problem 5,126.

### Pewter-Finished Die Casting

Q.—We have for a long time been using zinc alloy die castings for lighting fixture parts. Our experience has been highly satisfactory on account of their precision and uniformity of finish. However, as a rule they have been plated, oxidized, scratchbrushed and lacquered, usually in statuary bronze.

Just now we propose to supply them in a satin pewter finish and take advantage of the natural color of the alloy, finally applying a clear lacquer.

Past experience would indicate that we might expect a considerable darkening of the finish after a year or two of service, and we would like to have you assure us of the life expectancy of this finish for interior use, and suggest a method to overcome the possibility of finish failure.

A.—We can see no reason why you should have any more trouble with the pewter finish than you have had with other finishes as far as tarnish or discoloration is concerned, providing a good grade of lacquer is used. There may be some difficulty in getting proper adhesion of the lacquer unless a special grade is used.

We would suggest that you take this question up with your lacquer manufacturer. If he cannot supply you with the proper material, we can advise where you may obtain it.

The life of any finish, where lacquer is used to protect it, depends upon the quality of the lacquer and the way it is applied.

O. J. S., Problem 5,127.

### Plating on Stereotype

Q.—We are about to enter a side line of plate making in addition to our electrotype foundry, viz., casting stereotype plates, and after casting, nickel plating same. I understand it is necessary to give them a copper strike or deposit before the nickel plate. I understand a cyanide of copper battery is used. Will you please give us in brief, full particulars as to method of procedure for cleaning, preparing cyanide of copper solution, etc.?

A.—Stereotype metal may be nickel plated direct, but better adhesion of the deposit will be obtained if the work is plated in a warm cyanide copper solution from 5 to 10 minutes before nickel plating.

The plates should be cleaned in a mild alkaline cleaning solution for which consult manufacturers listed in the "Buyers' Guide" pages. Use 2 ounces per gallon of water at or near boiling temperature; then rinse in clean water; dip in a cyanide solution made of sodium cyanide 6 ounces, water 1 gallon; rinse in clean cold water; and plate in the cyanide copper solution.

Formula for the cyanide copper solution:

Copper cyanide .....	3½ oz.
Sodium cyanide .....	4½ oz.
Sodium carbonate .....	2 oz.
Sodium hyposulphite .....	1/64 oz.
Water .....	1 gallon

Operate solution at 110° F., with 1½ to 2 volts at 4 to 6 amperes per square foot of work surface. After plating in this solution, rinse thoroughly and place in the nickel solution.

Formula for nickel solution:

Double nickel salts .....	8 oz.
Single nickel salts .....	4 oz.
Sodium chloride .....	2 oz.
Boric acid .....	2 oz.
Water .....	1 gallon

Operate this solution at a pH of 5.8 to 6; 6 to 8 amperes per sq. ft.; 2 to 2½ volts. This solution is used at room temperature. It is best to use a plating generator for the source of current instead of a battery unit. O. J. S., Problem 5,128.

### Silver Solution

Q.—We are sending you a sample of our ten-gallon silver solution which has not been used for one year. It was filtered and at present is kept in a 25-gallon tank.

We would appreciate your informing us the exact amount of metal to be added in order that we may have a 22-gallon solution.

A.—Analysis of silver solution:

Metallic silver .....	0.22 oz.
Free cyanide .....	0.08 oz.

To replenish the solution and have a volume of 22 gallons, add to the solution 60 ounces of silver cyanide and 8½ pounds of sodium cyanide. O. J. S., Problem 5,129.

### Stripping Cobalt

Q.—Kindly inform us what method would be best for stripping cobalt plating from steel or copper without damaging the base.

A.—There is no way that we know of to strip cobalt from steel or copper without doing some damage to the underlying metal.

O. J. S., Problem 5,130.

### Tarnished Reflectors

Q.—Please advise us why auto reflectors tarnish within a few hours after they are resilvered.

A.—We are unable to understand why your silver-plated reflectors tarnish so readily, unless there is an abundance of sulphur or sulphur compounds that come into contact with the silver deposit. Silver is very readily tarnished by sulphur compounds that may be in the water used for plating or in the atmosphere.

The tarnishing may be prevented by applying a film of lacquer to the silver; however, this would decrease the reflection of the silver finish.

Rubber, such as tires, contains sulphur and should be kept away from the exposed silver, especially before the reflectors are installed and enclosed in the lamps. O. J. S., Problem 5,131.

# Patents

## A Review of Current Patents of Interest

Printed copies of patents can be obtained for 10 cents each from the Commissioner of Patents, Washington, D. C.

1,853,369. April 12, 1932. **Formation of Chromium Alloy Coatings.** Leslie H. Marshall, Columbus, Ohio, assignor to The Technimet Company, Columbus, Ohio.

The process of forming alloy coatings of chromium which includes the steps of surrounding the article to be coated with a packing containing chromium or an alloy of chromium and the metal of which the said article is constituted.

1,853,370. April 12, 1932. **Formation of Silicon Alloy Coatings.** Leslie H. Marshall, Columbus, Ohio, assignor to The Technimet Company, Columbus, Ohio.

The process of forming alloy coatings of silicon which includes the steps of enclosing the article to be coated with a packing containing silicon or an alloy of silicon and the metal of which the said article is constituted.

1,853,385. April 12, 1932. **Process of Making Mold of Alloy.** William P. Spade, Watervliet, N. Y., and James H. Spade, Los Angeles, Calif.

The process of forming a mold or the like which comprises impressing the pattern into a mass of metal particles of sufficient fineness to be relatively arranged by the details of the pattern, and thereafter cementing the particles, together with an alloy structure by another metal.

1,853,700. April 12, 1932. **Method of Making Caskets by Galvanoplastic Process.** Gunnar Rosenqvist, Pittsburgh, Pa.

The method of manufacturing metal bodies of finely divided deposited metal having metal inserts formed integrally therewith which comprises providing a permanent mold, placing metal inserts on the surface of the mold, bridging the gaps between the inserts and mold surface with metal flakes and making deposits on the exposed surface of said mold and inserts to form a unitary body of metal.

1,854,763. April 19, 1932. **Electroplating Machine.** Hedley J. Richards and William E. Hinton, St. Louis, Mo., assignors to Lasalco, Inc., St. Louis, Mo.

An electroplating machine comprising an open top electrolyte container, a tumbling barrel provided with peripheral tracks, flexible connections for supporting said barrel in raised position out of said container and operable to lower said barrel therein to, and motor-driven mechanism in said container for engaging and revolvably supporting said barrel when in lowered position within said container.

1,854,953. April 19, 1932. **Light**

**Metal Alloy.** Percy Pritchard, Smethwick, near Birmingham, England, assignor, by mesne assignments, to Aluminum Company of America, Pittsburgh, Pa.

An alloy consisting of 0.5 to 3.5 per cent of nickel, 8.0 to 13.0 per cent of silicon, the balance being aluminium.

1,855,377. April 26, 1932. **Coating Material for Metal Articles.** Rudolf Auerbach, Berlin-Neuenhagen, Germany, assignor to Wilhelm Steinhorst, Leipzig, Germany.

1,855,436. April 26, 1932. **Magnesium Base Alloys.** Robert Thomas Wood, Lakewood, Ohio, assignor to American Magnesium Corporation, Pittsburgh, Pa.

1,856,261. May 3, 1932. **Coating Surfaces of Iron or Steel.** William M. Phillips, Birmingham, and Guy M. Cole, Detroit, Mich., assignors to General Motors Corporation, Detroit, Mich.

1,856,272. May 3, 1932. **Plated Piston.** Caleb E. Summers, Pontiac, Mich., assignor to General Motors Corporation, Detroit, Mich.

1,856,293. May 3, 1932. **Process of Melting and Deoxidizing Metals and Alloys.** Wilhelm Reitmeister, Kirchmoser (Havel) Werk, Germany.

1,856,606. May 3, 1932. **Stabilization of Liquid Hydrocyanic Acid.** Mark Walker, South Pasadena, Calif., assignor to The Pacific R. & H. Chemical Corporation, Los Angeles, Calif.

1,856,615. May 3, 1932. **Aluminum-Magnesium Alloys.** Robert S. Archer, Lakewood, and Louis W. Kempf, Cleveland, Ohio.

1,856,679. May 3, 1932. **Apparatus for Communiting Metals.** Harry M. Williams and Victor W. Bihlman, Dayton, Ohio, assignors to General Motors Research Corporation of Delaware.

1,857,547. May 10, 1932. **Chromium Plating.** Chad H. Humphries, Indianapolis, Ind., assignor to Metals Protection Corporation, Indianapolis, Ind.

1,857,600. May 10, 1932. **Manufacture of Metal Covered Copper Wires.** Georg Masing, Berlin, Germany, assignor to Siemens & Halske, Aktiengesellschaft, Siemensstadt, near Berlin, Germany.

1,857,752. May 10, 1932. **Electrolytic Production of Tin from Alkali Stannate or Alkali Stannite Lyes.** Werner Faselau, Berlin-Siemensstadt, Germany, assignor to Siemens & Halske Aktiengesellschaft, Siemensstadt, near Berlin, Germany.

1,857,879. May 10, 1932. **Metal Powder.** Walter Schudardt, Mannheim, Germany, assignor to I. G. Farbenin-

dustrie Aktiengesellschaft, Frankfurt-on-the-Main, Germany.

1,857,929. May 10, 1932. **Decorating and Etching Metals.** James C. McFarland, Fort Thomas, Ky., assignor to The Wadsworth Watch Case Co., Dayton, Ky.

1,857,947. May 10, 1932. **Refining and Purification of Metals.** George F. Doran, Worcester, Mass.

1,858,092. May 10, 1932. **Heat Treatment of Strong Aluminum Alloys.** Noak Victor Hybinette, Wilmington, Del., assignors to The Nicalumin Company, a Corporation of Michigan.

1,858,125. May 10, 1932. **Galvanizing or Electroplating Process.** Michael von Devecis, Budapest, Hungary, assignor to Waldberg Societe Anonyme, Paris, France.

1,858,415. May 17, 1932. **Alloy.** Norman B. Pilling, Plainfield, N. J., assignor to Westinghouse Electric & Manufacturing Company, a Corporation of Pennsylvania.

1,858,631. May 17, 1932. **Process for Producing a Coating of Chromium on Objects of Iron and Steel or Aluminum and Particularly on Knives, Forks, and Spoons.** Heinrich Leiser, Berlin-Friedenau, Germany.

1,858,669. May 17, 1932. **Recovery of Tin from Scrap Tinned Plate and Like Tin-Carrying Material.** John William Hinchley, London, England, assignor to The African Tin Recovery Company, Limited, Port Elizabeth, South Africa.

1,859,169. May 17, 1932. **Alloy.** Harry S. Ream, Jr., and Frank J. Hein, Dover, Ohio, assignors to Shenango-Penn Mold Company, Pittsburgh, Pa.

1,859,419. May 24, 1932. **Electric Induction Furnace.** Dudley Willcox, Lawrenceville, N. J.

1,859,668. May 24, 1932. **Plating Machine.** Vance D. Hamilton, Ferndale, Mich.

1,859,680. May 24, 1932. **Induction Electric Furnace.** Heinrich Neuhauss, Dusseldorf, Germany, assignor to The Ajax Metal Company, Philadelphia, Pa.

1,859,734. May 24, 1932. **Method of Removing Oxide Coatings from Metals.** Harry S. George, Massapequa, N. Y., assignor to Electro Metallurgical Company, a Corporation of West Virginia.

1,859,749. May 24, 1932. **Noncorrosive Metal and Article Made Therefrom.** Felix Nicodemo, New York, N. Y., assignor to Indestructible Alloy Company, Inc., New York, N. Y.

1,860,095. May 24, 1932. **Lead Alloy.** Henry Harris, London, England. Filed Sept. 19, 1931, Serial No. 563,888, and in Great Britain May 6, 1930.

# Equipment

**New and Useful Devices, Metals, Machinery and Supplies**

## Chromium Unit for Machine Shops

Drills, taps, reamers, files, dies and punches, and many other tools and parts which are made to last longer by chromium plating, may now be plated as a part of the regular routine of the machine shop tool room. United Chromium, Incorporated, 51 East 42nd Street, New York City, has designed a compact chromium plating unit expressly for machine shops. It is built and sold by the company.

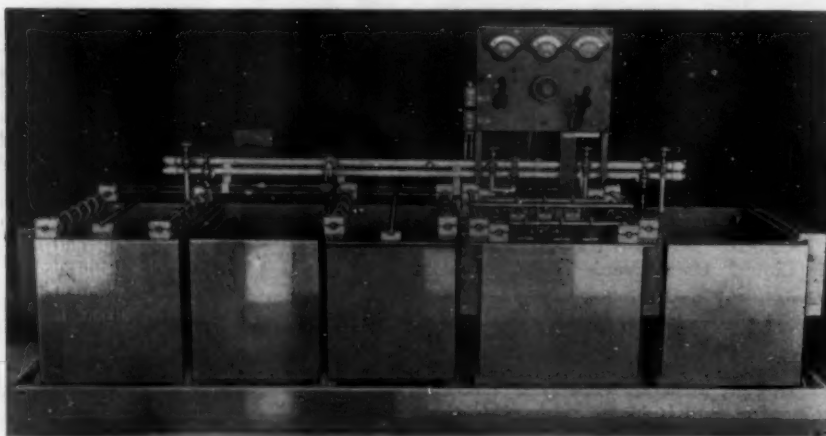
This new plating unit is compact and well designed. It may be moved into the tool room and immediately connected to current, steam, water and waste outlets. It is simple and can be successfully operated by the workman in the shop. It is economical to use, and of sufficient size and versatility to plate the many tools and

parts on which chromium is so useful, it is stated.

With the new unit the shop has the advantages of chromium plating at its disposal with none of the difficulties and delays incident to sending a part out of the factory or into another department for plating.

The equipment comes as a unit—with all parts assembled on one base—and its purchase involves only one transaction, the maker states. It is designed to produce the best results under shop conditions, with lowest reasonable labor costs.

It is claimed that the economies which are obtained by chromium plating can pay for this equipment in a short time, even in a small machine shop.



Compact Chromium Plating Equipment for Machine Shops,  
by United Chromium, Inc.

## Mechanical Japanning and Varnishing Equipment

The Maculer japanning and varnishing machine, developed in Germany and patented in the United States as well as abroad, is offered through H. P. Luhn and Associates, 2 Stone Street, New York City. The machine provides a mechanical means of coating metal products with japan or varnish, as well as other finishes used for rustproofing, metallizing, etc. It is a tilting tumbler type of equipment, with a heating unit using gas or electricity. Advantages claimed for the machine include uniform coating, strong bond with metal, smooth, clean finish, non-sticking of pieces to each other, and positive elimination of explosion danger in drying; also, saving of material, time and general costs.

It is stated that about 1,000 such machines are in use abroad by makers of such products as small metal ware, springs, screw machine products, hardware, buttons, etc.

## Shaped Grinding Tools

A special line of grinding tools for special uses has been developed by the Norton Company, Worcester, Mass. The tools are designed to provide for a wide variety of applications, and there are over 100 shapes, ranging from points of  $3/32$ " diameter up to wheels of 1" diameter. They are made mostly of a special grade of aluminum oxide abrasive suitable particularly to tool and die work, and are mounted for use with standard machines. Silicon carbide abrasive points and wheels are provided

for nonferrous grinding. Spindles are made of special steel which is copper and nickel plated. Knurled chisel ends provide for permanent anchoring of abrasive wheels on the quills, a special high-strength cement being used to bond the wheel to the metal. Most of the abrasive bonds are vitreous; bakelite bonds are provided for points and wheels used in special applications.

## Special Rubber Tank Linings

Triflex-lined steel tanks with brick sheathing were designed originally for steel pickling operations, but as is usually the case with product innovations, this development has been found applicable to many other chemical processes where high temperatures and rough service are encountered, declares a recent bulletin of The B. F. Goodrich Company, Akron, Ohio.

A fair-sized line of equipment has been developed in which this new construction principle of the Goodrich company has been or can be applied to advantage, according to the manufacturers. Among these are plating tanks.

Such operations have heretofore been considered too severe for rubber linings, but with development of "Triflex" and use of brick sheathings, "Vulcalock" tanks provide excellent equipment, it is said.

"Triflex" is a new form of rubber lining which combines advantages of both hard and soft rubber, and eliminates the apparent weaknesses of each through sound engineering practice, Goodrich engineers declare. Actual resistance of "Triflex" to impact is nearly 10 times that of ordinary rubber linings. Specially designed expansion joints are said to prevent effectively cracking and distortion of the impervious hard rubber layer, ordinarily caused by expansion and contraction with changes in temperature.

Brick sheathings make for freedom from damage to the rubber through gouging or impact of heavy steel parts, and lower the temperature at the rubber surface to offset the effects of acid and oxidation. A four-inch brick sheathing, for example, will reduce the temperature from  $212^{\circ}$  F. in the bath to  $155^{\circ}$  F. at the surface of the rubber. This insulating effect persists in spite of acid seepage through the brick, it is stated.

"Vulcalock," used in these installations, is a process developed and used exclusively by Goodrich for bonding soft, acid-proof, resilient rubber to metal, and insures practically integral adhesion between rubber and steel, a minimum of 500 pounds per square inch.

## Charles Cooper and Company in Business Seventy-five Years

Charles Cooper and Company, New York, this year celebrates its Diamond Anniversary, having maintained for 75 years a position among the leaders in the manufacture of industrial chemicals. The company is well known to METAL INDUSTRY's readers as a highly reliable source of plating and finishing chemicals.

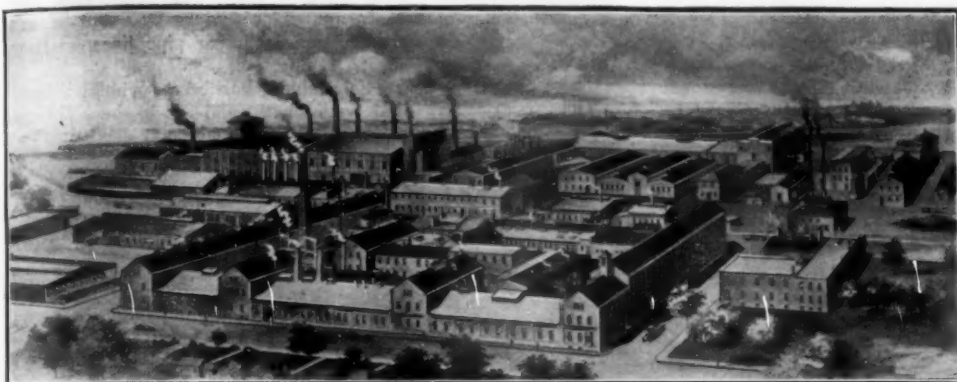
The history of this progressive and alert company is interesting. Recognizing the

until today shipments are being made continuously to many plants throughout the United States and Europe.

It was a natural development, early in their career, to meet the broad demand for platers' chemicals, and now they are recognized as leaders in supplying uniform, pure, dependable, acids, oxidizers, salts, lacquers, cleaners, etc., in fact a full line of platers' and finishers' chemicals.

During three quarters of a century as manufacturers the company has been a pioneer in development of many chemical products for commercial use. It is a tribute to the ability and foresight of the firm's technical staff.

Indicative of Cooper's progressive policy is its leadership in the standardization of packages. All dry chemicals are packed in one, ten and thirty pound cans, hundred pound kegs, and original packages (barrels); liquids are packed in one pound (pints); half-gallon, five, fifty or one hundred gallon containers. The plant control laboratory makes a check analysis on every shipment, a guarantee of Cooper quality which means adequately meeting



A View of the Extensive  
Chemical Manufacturing  
Facilities of Charles  
Cooper and Company at  
Newark, New Jersey.

advantages of locating their plant in such an industrial center as was promised by Newark, today over 50 buildings house their manufacturing activities, while five trunk railways and motor truck metropolitan delivery provide exceptional facilities for prompt shipment.

Starting in 1857 as manufacturers of pharmaceutical and photographic chemicals, production was soon extended to meet the chemical needs of many basic industries

Leadership as manufacturers in the chemical field has been maintained by Charles Cooper and Company for the past seventy-five years, largely due to the character and ability of its executive personnel, technical staff and trained plant organization. A policy of progressive management and administration has kept pace with industry's constant march onward, and Cooper's chemicals have a fine reputation for purity, uniformity and dependability.

standard specifications and exacting industrial requirements.

Today, broader and more substantial fields for progress are ahead, based on the real industrial achievements of the past. So the Cooper company confidently continues to pioneer in the chemical industry, appreciating the confidence they have merited in the past from their customers, and giving promise of maintaining Cooper quality in the future.

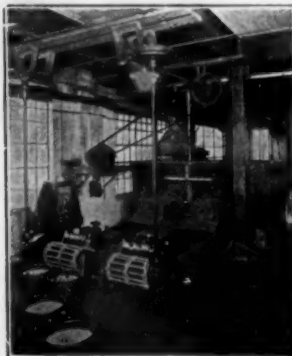
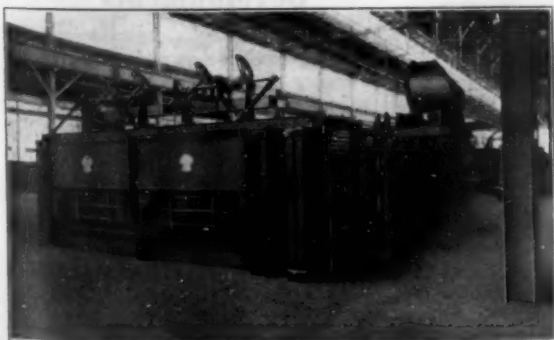
## Heating and Cooling Wire

W. S. Rockwell Company, 50 Church Street, New York City, manufacturers of a wide variety of industrial furnaces and other heating equipment, have prepared a bulletin, No. 339, covering methods of heating and cooling of wire and other thin

metal products in strands, strips and coils. The bulletin gives a good summary of technical information, together with many illustrations showing furnace layouts, etc.

The company states that improved methods of performing this work are necessary

to meet modern competitive conditions and technical requirements. No single fuel or equipment can provide for all requirements. The bulletin, which is available to readers on application to the company, illustrates the attention this firm has given to the subject, and the equipment it has designed to meet the needs of industry.



Various Types of Rockwell Equipment for Heating and Cooling Wire and Strip Metal.

### Automatic Polishing Equipment for Heavy Production

Excelsior Tool and Machine Company, East St. Louis, Ill., announces a newly developed automatic polishing machine, No. 27-B, for production polishing of automobile bumpers. It is said to have the unique ability of polishing the modern high-curve, bent-edge or straight type bumper from eye to eye without reversing the work to obtain a uniform finish. An innovation is the provision for equalizing the wheel pressure to eliminate severe wear of the polishing wheels in passing up the curved surface.

The machine is equipped with two wheels which rotate over a horizontal moving platform which carries the bumpers. The platform is adjustable for bumper length. The wheels travel in opposite directions, passing over each bumper in turn. Pro-

chine is the No. 27, similar in design to the bumper polisher described above. The machine is fitted with wheels of the types necessary for the required finishes. Equipment is provided for rotating the cylindrical extinguisher bodies so that beside rotation of the wheels and lateral movement of the table the work also revolves, aiding the polishing action considerably and effecting higher efficiency, speed, etc.

Complete data on the equipment can be obtained by readers, who should address the manufacturer.

### Udylite Ball Anode Holder

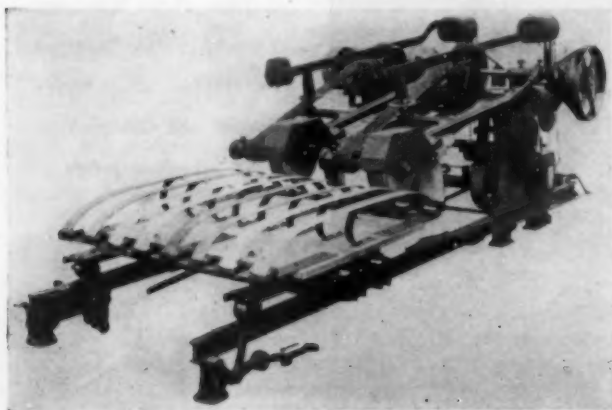
Udylite Process Company, Detroit, Mich., licensors of the "Udylite" cadmium plating process, have been granted United States Patent No. 1,868,052 on a helical coil container for cadmium anodes. The anode holder comprises a helix of wire, with the

wheel, being of rubber, provides the abrasive band with a soft cushion which will be greatly appreciated when various buffing and polishing operations are done. The wheels and bands range from 1/2 inch to 2 inches in diameter.

### Wire Cup Brushes for Use With Portable Machines

Herold Manufacturing Company, 1104 West 9th Street, Cleveland, Ohio, has developed a line of steel wire cup brushes to be used with powerful electric and pneumatic portable tools. These brushes are used for removing rust, scale, old paint and other undesirable material from structural iron work, bridges, gas tanks, tank cars, coal cars, ships and many items of new construction including pipe lines, castings, sheets, tubing, etc.

The problem has been to build a brush that would withstand much abuse through operation under many trying conditions.



Left to Right—Excelsior Bumper Polisher, Udylite Ball Anode Holder, and Herold Wire Cup Brush Attached to Portable Machine.

vision has been made for lateral resiliency, which allows the wheel surface to follow the edgewise contour of bumpers which are not made of flat bar stock. Eight bumpers are carried on the carriage at one time, held by fastening devices of easy operation. As each bumper is finished the next is moved under the wheels by a hand wheel. A locking device holds it in correct position. Work is always in plain view of operator. The machine is never stopped to remove or load the work, this being done with machine in operation, and it is stated that two machines can easily be attended by one operator. Stops are made only for attention to wheels, which are changed when they become dull. Foot treadles raise and automatically lock the wheels when necessary to take them off the work.

Edge bent bars are polished by using a special attachment which guides the wheels and keeps them on center for the full stroke over the bar.

The specifications include belts; spindles mounted in dust-proof ball bearings; all necessary dust hoods, guards, etc. Motor is 20 H.P., 1,900 R.P.M., ball bearing and dust-proof, with push button control and 8 V-belt drive having adjustment for take-up. The machine weighs 5,600 pounds.

Excelsior Tool and Machine Company also offers a completely modern machine for polishing fire extinguishers. This ma-

convolutions fairly widely spaced at top and with spacing diminishing as the convolutions approach the bottom. This provides for adequate exposure of anodes as they are inserted, as well as adequate holding as they diminish in size and fall toward the bottom.

### Small Arbor Bands

Small rubber wheels about 1/2-inch in diameter, and abrasive bands to fit, have been manufactured for several years for the dental profession by the Torit Manufacturing Company, St. Paul, Minn. This company, after using larger wheels and bands in its buffing and polishing department, is now convinced that it has something that should be in demand in many industries.

Torit Manufacturing Company offers these rubber wheels and abrasive bands in various sizes. Torit arbor bands are easily put on the rubber wheel, which is then just as easily expanded to tighten the band. The maker states. A turn of a nut loosens the band for removal when worn out. The

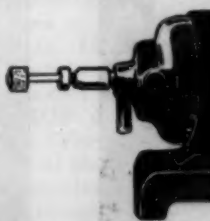
This was met by the Herold company with the new "Superior" cup brushes, which are said to be giving very good performance. Special grades of wire in various gauges are tightly compressed into cup shape and supported by a specially designed stamping. The cup brushes have a standard opening of two inches into which adapters with proper size arbor hole are inserted. The illustrations show the brush with adapters, and as mounted on an electric tool.

New uses for this type of brush are being continually uncovered, saving a great amount of labor and performing very satisfactorily, the maker states.

### Developments

MONEL METAL bolts have solved the problem of excessive corrosion encountered in fastening condenser and intake lines of oil refineries and other plants located on salt water bays and harbors, according to International Nickel Company, New York.

CADMIUM deposits electroplated by the "Udylite" process have been found highly efficient as rust preventive on steel radio condensers which are stamped after plating, according to Udylite Process Company, Detroit, Mich. This type of electrodeposit has also been specified for parts of refrigerator cars such as trolley wheels and hangers, pins, nuts, bolts, fittings, etc.



Torit Arbor Band on Spindle.

## Equipment and Supply Catalogs

**Nickel-Clad Steel.** Lukens Steel Company, Coatesville, Pa. Bulletin.

**General Electric Company,** Schenectady, N. Y., publications: Splash-proof Motors; Squirrel-cage Motors.

**Grinding Points.** Norton Company, Worcester, Mass. Illustrated booklet on mounted wheels and points in various shapes.

**Immersion Heaters.** Harold E. Trent Company, 618 North 54th Street, Philadelphia, Pa. Circular on electric heaters for liquids, etc.

**Tanks.** The American Brass Company, Waterbury, Conn. Bulletin on Rust-proof tanks made of "Everdur" metal. Illustrated.

**Employees' Suggestion Systems.** Metropolitan Life Insurance Company, New York. Interesting booklet on an industrial management idea.

**Packaging.** National Metal Edge Box Company, Callowhill at 12th Street, Philadelphia, Pa. Brochure on containers for various products, and equipment for its use.

**Conveying Equipment.** Trowbridge Conveyor Company, 382 Broadway, Passaic, N. J. Various circulars on

loading bagging, fuel handling, conveying and carrying equipment.

**Welding.** The Linde Air Products Company, 205 East 42nd Street, New York. Illustrated 16 page booklet on various uses of welding in repair shops, etc., titled "Repairing for profit."

**Cold Strip Reels.** United Engineering and Foundry Company, Pittsburgh, Pa. Bulletin P-203 on equipment for reeling, winding, coiling, etc., of all commercial metals; and accessories. 32 pages, illustrated.

**Hard Rubber.** The B. F. Goodrich Rubber Company, Akron, Ohio. Booklet of new information on hard rubber sheet, rod, tubing, etc., with data on properties, applications, methods of working, etc.

**Lacquer.** E. I. Du Pont de Nemours and Company, Parlin, N. J. "A Clear Lacquer for Metal Protection," is a beautiful 24 page booklet describing and illustrating the development of a new type of lacquer.

**Consulting Service.** Lucius Pitkin, Inc., 47 Fulton Street, New York. Circular on chemical and metallurgical consulting engineering service, assaying, sampling, etc. An outline of this well known firm's activities.

## Plan for Employment of Technical Men

Frank G. Breyer of Singmaster and Breyer, New York City, consulting chemical and metallurgical engineers, will address the Pennsylvania Chapter of the American Institute of Chemists and the Philadelphia Section of the American Chemical Society on September 22, at 8 P. M., at Harrison Laboratory, University of Pennsylvania, Philadelphia, Pa. His subject will be "Unemployment of Technical Men—How to Meet It."

Mr. Breyer is executive chairman of the Committee on Unemployment and Relief for Technical Men in New York. Mr. Breyer is author of "Research by the Unemployed," an article in the July issue of "The Chemist," publication of the American Institute of Chemists. He outlines a plan whereby unemployed chemists could be paid out of relief funds for research at universities and other institutions which have signified willingness to co-operate. Funds would be raised from various possible sources, based on a survey of the needs. For this purpose it is requisite that unemployed chemists register with the various chapters of the Institute of Chemists. Employed chemists are being requested to contribute, and legislation is sought for federal aid.

Headquarters of the American Institute of Chemists is at 233 Broadway, New York City.

## Personals

### Herbert T. Herr, Jr.

Herbert T. Herr, Jr., who was recently elected president of J. S. McCormick Company to succeed the late John S. McCormick, founder of the business, has been associated with Mr. McCormick for the past nine years, first as sales manager, later as vice-president and general manager in charge of sales and production.

Prior to his affiliation with the J. S. McCormick Company, Mr. Herr was associated with the Westinghouse Electric and Manufacturing Company, of which his uncle, Edwin M. Herr, and father, H. T. Herr, were president and vice-president, respectively. Mr. Herr served this company as steam service engineer after graduating from Yale University's Sheffield Scientific School, where he was a member of the football team for three years, and of the track team, as well as class treasurer. Before entering college he had served in the U. S. Field Artillery during the War, and had been employed in the copper mines in Utah.

Mr. Herr served his apprenticeship with the Westinghouse Company, and much of his time was spent working in the foundry. He is a member of Tau



HERBERT T. HERR, Jr.

Beta Pi, honorary engineering society, and various clubs and business organizations in the city of Pittsburgh.

Edward M. ("Stephie") Stephenson, New England representative of the H. V. Walker Company, Elizabeth, N. J., manufacturers of lacquers and enamels, has just completed twenty-five years of

lacquer selling in New England. Mr. Stephenson has had an enviable career the past quarter century. He has to his credit a goodly share of the early pioneering that was required to introduce lacquer to many industries which now find the material indispensable as a decorative and protective coating. Products which "Stephie" says he was the first to induce their makers to coat with lacquer include furniture, wooden clocks, silk spools, steel and iron tools, straw hats, auto fenders, sheet celluloid and many others, which, he says, "it would take me another 25 years to name." However, "Stephie" believes history can always be made, and he plans to continue to explore new fields while revisiting the old, with a general intention of keeping down the cotton surplus, since cotton is the basic material for making cellulose lacquers in which his company specializes. His headquarters are at 244 Whiting Lane, West Hartford, Conn.

Samuel Frankel, formerly sales director for the Niagara Falls Smelting and Refining Corporation, Buffalo, N. Y., has been appointed manager of the special alloys department of H. Kramer and Company, Chicago, Ill., ingot metal manufacturers, smelters and refiners.

**R. F. Craig**, formerly New York district manager, has been made Eastern district manager of Permite sales for Aluminum Industries, Inc., Cincinnati, Ohio. He will be assisted by **J. F. Christman** and **S. D. Owen**. **J. C. Sullivan** is now identified with the Kansas City office of the Permite sales organization.

**Carl M. Kaltwasser** has been elected president and general manager of

Watson Manufacturing Company, Inc., Jamestown, N. Y., successor to unincorporated firm of the same name. **William W. Watson** has been made secretary-treasurer.

**V. S. Veenman** has been appointed foundry superintendent for France Foundry and Machine Company, Toledo, Ohio. He will have charge of jobbing and production of bronze and aluminum castings.

**W. H. Bassett**, metallurgical manager, American Brass Company, Waterbury, Conn., has been elected vice-chairman of Committee B-1 on Copper Wire of the American Society for Testing Materials.

**Sam Tour**, vice-president of Lucius Pitkin, Inc., New York, has been elected vice-chairman of Committee B-7 on Light Metals and Alloys, and Alloys, Cast and Wrought.

## Obituaries

### Edward R. Hoyt

Edward R. Hoyt, who with his brother founded the Hoyt Metal Company, St. Louis, Mo., died last month of a heart attack at Ogunquit, Maine. He was 75 years of age.

Mr. Hoyt was looked upon as the father of the antimonial-lead business, taking up this alloy when it was a by-product and developing its use and markets until it became one of the most important alloys in point of use.

Early in life Mr. Hoyt with his brother Charles, left Greenfield, Mass., and went to St. Louis. About 1880 they opened a little mixed-metal business in that city. Largely through the tremendous energy and enterprise of the younger brother, Edward, the business forged steadily ahead and in 1903 it was acquired by the United Lead Company. Edward R. Hoyt was elected president at that time and continued as head of the United Lead Company until he retired in 1907 to continue as chairman of the board.

The Hoyt Metal Company as a subsidiary of the United Lead Company and a component of the National Lead Company, became the largest manufacturer of mixed metals in the world.

Mr. Hoyt is survived by his widow and one son.

### John S. McCormick

John S. McCormick, president and founder of the J. S. McCormick Company, Pittsburgh, Pa., manufacturers of foundry facings, supplies and equipment, was fatally injured in an automobile accident on June 25, 1932.

Mr. McCormick was a pioneer in the foundry facing business, and was well known throughout the foundry industry, having established the company which bears his name over forty years ago. He was a charter member of the Foundry and Machine Exhibition Company, which later became affiliated with the American Foundrymen's Association, and also a charter member of the Pittsburgh Foundrymen's Association.

He took a very active interest in the welfare of the younger generation, and was treasurer of the Boys' Club of Pittsburgh, as well as philanthropic and business affairs in Pittsburgh.

### W. J. Cook

W. J. Cook, for fifty years executive head of the galvanizing departments of the Wheeling Steel Company, Wheeling, West Va., died August 19, 1932.

Mr. Cook was the subject of a long personal notice in the July issue. As there stated, he was head of a family which has been foremost in the development of hot galvanizing in the United States since 1867, when the father of W. J. Cook came



W. J. COOK

to this country to establish an English galvanizing plant. The father later set up a plant of his own, where W. J. Cook received his early training. He went to Wheeling in 1882 to set up a plant for the Whittaker company, which had a number of changes and finally became the present Wheeling Steel. During the half century he was in charge the output of galvanized work rose from 35,000 to 350,000 tons.

Mr. Cook is survived by several brothers who are executives of galvanizing plants in various parts of the country, and his son, Nelson E. Cook, who is now in charge at Wheeling.

### John D. Langell

John D. Langell, for 30 years superintendent of the Detroit Shipbuilding Company, died recently of a heart attack. He was widely known as builder of many of the Great Lakes ships. F. J. H.

### James Hughes

James Hughes, pioneer Wisconsin foundryman, died July 24, 1932, aged 75 years.

Mr. Hughes served the foundry industry for fifty years, retiring in 1921. After his apprenticeship at the foundry of Blanchard and Arnolds, Milwaukee, he worked for E. P. Allis Company, Milwaukee, and Duncan Taylor, Green Bay, Wis., as journeyman founder. In 1879 he set up the Eagle Iron and Brass Foundry at Green Bay, and operated it for 13 years. Then he went to the American Wood Working Machinery Company, the Marinette Iron Works, and the Giddings and Lewis Machine Tool Company, serving each as foundry superintendent. He was widely known in Wisconsin as a foundryman of exceptional ability.

Mr. Hughes is survived by two sons in the foundry industry, William Hughes, general foundryman for the Nash Company, Kenosha, Wis., and James Hughes, Jr., salesman for Frederic B. Stevens, Inc., Detroit, Mich.

### George B. Baldwin

George B. Baldwin, vice-president of the Detroit Brass and Malleable Iron Company, Detroit, Mich., died at Colchester, Ontario, August 14, 1932, where he was summering. Mr. Baldwin came to Detroit in 1929 from Birmingham, Ala., where for many years he had been sales manager of the Stockholm Pipe and Fitting Company. He was widely known in the fitting business. F. J. H.

### Lucian A. Dexter

Lucian A. Dexter, president of the National Brass Company, Grand Rapids, Mich., died August 22, 1932, after a year's illness. He was 59 years old.

Mr. Dexter started in Grand Rapids at 20 as a cutlery salesman. He organized the National Brass Company in 1912 as an extension of his Dexter Sales Agency.

### Edward P. Schramm

Edward P. Schramm, at one time a member of the Syracuse Chilled Die and Casting Company, Syracuse, N. Y., and president of the Hohen-Scheid Heat Treating Company, Detroit, Mich., died recently.

## News of Associations and Societies

### Newark Branch

The Newark Branch will hold its first annual clambake on Saturday, September 10, at Vogel's Grove, Springfield, N. J. Members are invited to bring friends. An ideal day is promised. Springfield is easily reached over well marked motor roads. The affair will start early in the day, with food and refreshments served both morning and afternoon; with the grand clambake at 4:30 P. M. Games are planned, including baseball for men and games for ladies. Tickets at \$4 for adults and \$1.50 for children are procurable from the committee composed of Horace H. Smith, 208 North 3rd Street, Newark; George Wagner, and Oliver J. Sizelove.

The Newark Branch held a deep sea fishing party on Saturday, August 13. Twenty-five members chartered four boats and caught 250 fish of assorted sizes, shapes, weights and varieties ranging from a baby sea bass to a good sized tuna fish. The catch was made off Waretown, N. J.

Two past presidents of the Society were in the party, Horace H. Smith and Philip Sievering, Sr. Past President George Gehling drove up from Philadelphia to meet the party late in the afternoon, and congratulated them on their catch.

### New England Jewelers and Silversmiths Association

The association has a committee working on a plan for the adoption of uniform credit practice in the trade. Stephen H. Garner, president of the association, is on the committee, together with members of a number of Attleboro and Providence firms. It is proposed that an agreement be made whereby there shall be no advance dating of bills of any kind, no memoranda or consignment privileges extended for longer than 30 days, and that bills become due and payable at the end of the credit period, the discount being allowed only for payment in cash on the 10th day of the following month.

### New York Silver Manufacturers

Cooperative manufacturing and the pooling of profits of certain standard items of silverware are expected as the result of discussions at a meeting of the New York Silver Manufacturers Association, Inc., held at the City Club August 3. A program for raising quality standards and elimination of duplicated items, was submitted by Benjamin Schwartz, who was elected at the meeting as counsel to the Association.

The following officers were elected at the meeting: Benjamin Omin, Hamilton Silver Company, New York, president; Abraham Cooperstein, Elgin Silversmith Company, New York, vice-president;

Charles Marks, Ariston Silversmiths, New York, secretary.

The competition with silverware of pewter ware and non-tarnishable copper, in their appeal to gift buyers of moderate means, was discussed at the meeting, as well as the piracy of designs among silversmiths.

Headquarters of the organization are at Room 1318, 11 West 42nd Street, New York City.

### Electrochemical Society

The Electrochemical Society will hold its 62nd meeting September 22-24, at the Hotel Cleveland, Cleveland, Ohio. The three days will be devoted mainly to scientific session, with a number of plant visits and social events scheduled as well. Thursday morning the Electrodeposition Division will hold its session, with Charles H. Eldridge president. The following papers will be presented:

Economic Importance of the Electrochemical Industries, by Charles L. Mantell  
Studies in the Electrodeposition of Cadmium from Cadmium Sulphate Solutions, by S. Wernick.

Corrosion of Cadmium Plate and its Prevention, by Gustaf Soderberg.

Anodes for Zinc Plating, by A. K. Graham and George B. Hogaboom.

Complex Cyanides in Brass Plating Solutions, by L. C. Pan.

Ultra-Rapid Nickel-Plating in France, by Marcel Ballay.

Improved Method for the Analysis of Gaseous Elements in Metals, by N. A. Ziegler.

Co-Deposition of Lead and Bismuth, by Colin G. Fink and Otis H. Gray.

The Throwing Power of Plating Baths, by Max Schlotter and Joachim Korpium.

Electrode Potentials of Iron-Manganese Alloys, by Cyril Wells and J. C. Warner.  
A 4,000 Ampere Sodium Conductor, by R. H. Boundy.

Immediately following this session, will be an informal Round Table Discussion during luncheon on "The Elimination of Pin Holes." Mr. Leon R. Westbrook will preside.

### National Metal Congress

The National Metal Congress and Exposition will take place October 3 to 7, 1932, at Buffalo, N. Y. Congress headquarters will be at the Statler Hotel, and the exposition will be at the 174th Regiment Armory. Twenty-seven papers have been scheduled by the American Society for Steel Treating. The following other societies are co-operating in the Congress: American Welding Society, Institute of Metals Division, American Society of Mechanical Engineers, Society of Automotive Engineers, Wire Association, and Drop Forging Institute.

### Ornamental Iron, Bronze and Wire Manufacturers

The conference of the industry represented by the National Association of Ornamental Iron, Bronze and Wire Manufacturers with the Federal Trade Commission on October 3, at Cambridge Springs, Pa., has been hailed through the country with enthusiasm. A great many firms have signified that they will be represented. The purpose of the conference is to formulate a means of eliminating certain unwelcome practices from the trade.

### American Welding Society

American Welding Society will hold its twelfth fall meeting October 3-7 at the Statler Hotel, Buffalo, N. Y. It will fall within the week of the National Metal Exposition which is also being held at Buffalo this year.

Sessions will be devoted to various phases of welding technique. A session on welding of nonferrous metals will take place beginning 9:45 A.M., October 4, with the following program:

WELDING NONFERROUS METALS IN DAIRY INDUSTRY, by A. T. Light, Plant Manager, York Ice Machinery Company.

WELDING DURALUMIN, by a representative of Union Carbide and Carbon Research Laboratories.

WELDING HIGH NICKEL ALLOYS, by J. G. Schoener and F. G. Flocke, International Nickel Company.

LEAD WELDING, by R. L. Ziegfeld, Lead Industries Association.

Headquarters of the Society are at 33 West 39th Street, New York City.

### Safety Congress

During the week of October 3 to 7, many delegates from metal plants and foundries of the United States will meet at the Wardman Park and the Shoreham Hotels in Washington, D. C., to consider practical, co-operative methods for the promotion of health and the reduction of accidents. A program will be conducted by the Metals Section of the National Safety Council, as a part of the Twenty-First Annual Safety Congress and Exposition. The General Chairman of the section is F. A. Lauerma, Republic Steel Corp.

The 294 metal plants which reported to the National Safety Council during each of the past three years have made splendid progress in accident control. For this period they decreased their accident frequency 43 per cent and accident severity 18 per cent. The 91 foundries which reported likewise reduced their accidents from 48.20 per 1,000,000 man-hours for 1929 to 23.62 for 1931. But in severity rates they decreased only from 1.95 days lost per 1,000 man-hours in 1929, to 1.84 in 1931.

The Metals Section program on Tuesday morning, Oct. 4, will include a number of addresses. The Tuesday afternoon session will be held jointly with the Industrial Health Section, with a "Symposium on the Dust Problem in Industry." There will be five addresses by specialists. The Wednesday and Thursday morning sessions will include a program on various safety questions in the metal industries.

### Metal Products Featured at First Houseware Show

The first annual Houseware Show, organized by the buying and selling branches of the houseware industry, was held at the Hotel Pennsylvania, New York, in July. It was a complete success as to both attendance and sales. It was exclusively for the trade, and its purpose was to bring buyers and sellers together, since ordinary sales efforts in this field are frequently hampered by the inability of the salesman to carry about samples of his line, housewares being generally heavy and bulky. The buyers, on the other hand, generally like to see a product before making commitments. It is reported a good amount of business was placed, buyers coming from all parts of the country to see the products displayed by the many manufacturers participating.

The largest portion of the exhibition space was taken up by makers or sellers of housewares made in whole or in part of metal, much of which was, of course, treated in some kind of plated or other finish. Among the new developments shown were chromium plated copper kitchen utensils by the Rome Manufacturing Company, Rome, N. Y. Their display included a variety of nickel and bright copper utensils also.

Other well-known manufacturing firms who showed metal products were Black and Decker Chromeware Corporation, Fanta Colored Aluminum Company, Federal Enameling and Stamping Company, General Electric, Kewaskum Aluminum Company, Massillon Aluminum Company, National Aluminum Manufacturing Company, National Enameling and Stamping Company, National Silver Company, Sheffield Manufacturing Company, Wheeling Corrugating Company, Forestek Plating and Manufacturing Company, Monarch Aluminum Ware Company.

### Corporation Reports

#### Profits

NEW JERSEY ZINC COMPANY, New York: \$487,896 for second quarter of 1932, against \$591,103 for preceding quarter, and \$865,252 for second 1931 quarter.

AMERICAN MACHINE AND METALS, INC.: \$20,104 for second quarter, against \$113,789 loss in previous quarter, and \$2,443 deficit for second 1931 quarter.

#### Losses

INTERNATIONAL NICKEL COMPANY, New York: \$629,327 for second 1932 quarter; and \$93,255 loss for first six months; comparing with \$3,359,886 net profit for first half of 1931.

SAVAGE ARMS CORPORATION, New York: \$140,465 for first half of 1932, against loss of \$160,580 for same 1931 period.

ALUMINUM INDUSTRIES, INC., Cincinnati, Ohio: \$19,062 for first six months of 1932, against \$102,600 net profit for same 1931 period.

WALWORTH COMPANY, Boston, Mass.: \$481,428 for first half of 1932, against \$1,100,418 deficit for 1931 period.

YALE AND TOWNE MANUFACTURING COMPANY, Stamford, Conn.: \$338,578 for first half of 1932, against \$104,914 loss first half of 1931.

## Scrap Metal Refining Decreases

### Government Census Shows Fewer Establishments, Smaller Output Values for Non-ferrous Scrap Other Than Precious Metals in 1931

The United States Bureau of the Census announces that, according to a preliminary tabulation of data collected in the Census of Manufactures taken in 1932, the establishments in the United States engaged primarily in recovering and refining non-ferrous metals (other than gold, silver, and platinum) and alloys from scrap and dross reported a production of such metals and alloys in 1931 to the value of \$32,524,634 (at f. o. b. refinery prices), a decrease of 66.9 per cent as compared with \$98,369,796 reported for 1929, the last preceding census year. These figures do not include data

for secondary metals recovered and refined by establishments engaged in smelting and refining from ore (primary refineries). The more important items which contributed to the total for 1931 are as follows: Copper, 25,820 tons, valued at \$3,715,809; lead, common and antimonial, 83,638 tons, \$7,075,385; brass and bronze, 54,056 tons, \$8,417,023.

Statistics for 1931, with comparative figures for 1929, are given in the following tables. The figures for 1931 are preliminary and subject to revision.

Table 1.—Summary for the Industry: 1931 and 1929

	1931	1929	Per Cent of Decrease
Number of establishments.....	93	106	-12.3
Wage earners (average for the year) <sup>1</sup> .....	2,609	4,134	-36.9
Wages <sup>2</sup> .....	\$3,146,317	\$5,574,322	-43.6
Cost of materials, fuel, and purchased electric energy <sup>3</sup> .....	\$28,140,163	\$83,444,918	-66.3
Products, total value <sup>3</sup> .....	\$34,236,292	\$105,882,655	-67.7
Nonferrous metals and alloys.....	\$32,524,634	\$98,369,796	-66.9
Other products (chemicals, etc.).....	\$1,711,658	\$7,512,859	-77.2
Value added by manufacture <sup>3</sup> .....	\$6,096,129	\$22,437,737	-72.8

<sup>1</sup>Not including salaried officers and employees. The average number of wage earners is based on the numbers reported for the several months of the year. This average probably exceeds somewhat the number that would have been required for the work performed if all had been continuously employed throughout the year, because of the fact that manufacturers report the number employed on or about the 15th day of each month, as shown by the payrolls, usually taking no account of the possibility that some or all of the wage earners may have been on part time or for some other reason may not actually have worked the entire month. Thus it becomes necessary to give equal weight to full-time and part-time wage earners in calculating the average, and therefore the average may overstate somewhat the amount of full-time employment. For this reason the quotient obtained by dividing the amount of wages by the average number of wage earners cannot be accepted as representing the average wage received by full-time wage earners.

<sup>2</sup>Manufacturers' profits cannot be calculated from the census figures because no data are collected for certain expense items, such as salaries, interest on investment, rent, depreciation, taxes, insurance, and advertising.

<sup>3</sup>Value of products less cost of materials, fuel, and purchased electric energy.

Table 2.—Non-ferrous Metals (Other Than Gold, Silver, and Platinum) and Alloys Recovered from Scrap and Dross—Production by Kind, Quantity, and Value: 1931 and 1929

	1931	1929
Aggregate value.....	\$32,524,634	\$98,369,796
Refined secondary metals, total value.....	12,812,809	36,125,384
Copper:		
Tons of 2,000 pounds.....	25,820	44,215
Value.....	\$3,715,809	\$14,648,156
Lead (common):		
Tons.....	26,931	29,634
Value.....	\$2,316,764	\$4,042,627
Antimonial lead:		
Tons.....	56,707	78,286
Value.....	\$4,758,621	\$10,945,001
Zinc:		
Tons.....	18,908	38,184
Value.....	\$1,414,593	\$5,322,352
Tin:		
Tons.....	1,270	1,361
Value.....	\$607,022	\$1,167,248
Alloys, total value.....	\$13,180,618	\$47,274,720
Brass and bronze:		
Tons.....	54,056	112,259
Value.....	\$8,417,023	\$33,427,374
Antifriction bearing metal:		
Tons.....	5,269	11,611
Value.....	\$1,104,342	\$4,212,937
Solders, all kinds:		
Tons.....	10,389	15,935
Value.....	\$2,481,007	\$7,267,091
Type metal:		
Tons.....	9,600	11,845
Value.....	\$1,178,246	\$2,367,318
Other nonferrous metals and alloys, including aluminum ingots, value.....	\$6,531,207	\$14,969,692

## Industrial and Financial News

### Remington Rand to Spend 4 1/2 Million for Materials

Believing conditions are on the upturn and that commodities should be bought at present price levels, James H. Rand, Jr., president and chairman of the board of Remington Rand, Inc., has issued instructions to the purchasing department of his company to buy immediately \$4,500,000 worth of raw materials and supplies for use during the balance of this year. The order will increase and stimulate activity in more than fifteen different fields of production, according to officers of the company.

The orders to be placed will embrace purchases of steel and iron products, non-ferrous metals, cotton cloth, paper and paper products, lumber and wood products, celluloid, paint, oil, machinery and equipment, furniture, hardware, electrical and rubber products.

### "Quality" Galvanized Sheet

American Zinc Institute, New York, which licenses and sponsors the use of the "Seal of Quality" marks for high grade galvanized sheet, announces that such sheets will be displayed at the following expositions: Illinois State Fair, Textile Building, August 20-27. Minnesota State Fair, Industrial Building No. 3, September 3-10. Dairy Cattle Congress, Waterloo, Iowa, Exhibition Hall No. 3, October 3-9; American Royal Livestock Show, Kansas City, Mo., Industrial Exhibit Building, November 12-19.

Representatives of the Institute will be present as usual to answer questions, and the exhibits will be enhanced by new features, it is stated.

### Course in Electroplating

The course in practical electroplating at the College of the City of New York commences its Fall term on September 29. The class will meet Monday and Wednesday evenings from 7 to 11 in the Chemistry Building, Amsterdam Avenue and 139th Street, New York City.

Lectures and laboratory work will be conducted by Dr. L. C. Pan. Among the subjects included are Faraday's law, current efficiency, thickness of plating, electrode potentials, polarization and depolarizers, conductivity, metal and hydrogen ion concentrations, buffers, brighteners, throwing power, porosity and corrosion tests, and analysis of plating solutions. All commercial plating processes, including copper, nickel, chromium, cadmium, zinc, brass, iron, lead, tin, silver, gold, platinum and rhodium, will be studied from the standpoint of electrochemical reactions and their control. In the laboratory, each student will make his own plating solutions

and analytical reagents and do the experiments, analyses and tests.

The work is arranged to meet the individual needs of each student. The course is open to all persons interested in electroplating metal finishing and chemical control of plating solutions. Registration may be made in person, or more conveniently by mail, enclosing check or money order for \$37.50 payable to "Board of Higher Education," address: Evening Session, Room 100, Main Building of the College, 140th Street and Convent Avenue, New York City. An extra charge will be made for late registration.

### Mirror and Grinding Wheel Simplification Effected

Division of Simplified Practice, Department of Commerce, Washington, D. C., announces that sufficient signed acceptances have been received from manufacturers, users and others interested to insure general acceptance of Simplified Practice Recommendation R137-32 on Dental Mouth Mirrors. It will therefore become effective September 15 and printed copies will shortly be sent to interested parties.

A similar announcement is made with

regard to Simplified Practice Recommendation R45-32 on Grinding Wheels, which will become effective October 1.

### Brass Ingot Statistics

Non-Ferrous Ingot Metal Institute, Chicago, Ill., reports average prices per pound received by its membership on commercial grades of six principal mixtures of ingot brass during the twenty-eight day period ending August 12, as follows, with comparison to prices received in the period ending July 15:

	—Month Ending—	
	Aug. 12	July 15
Commercial 80-10-10 (1% Impurities) .....	6.686c	6.838c
Commercial 78% .....	5.002c	5.250c
Commercial 81% .....	5.250c	5.503c
Commercial 83% .....	5.745c	5.750c
Commercial 85-5-5-5 .....	5.763c	6.026c
Commercial No. 1 yellow .....	4.276c	4.542c

The combined deliveries of brass and bronze ingots and billets by the members of the Institute for the month of July, 1932, amounted to 1,397 tons.

On August 1 unfilled orders for brass and bronze ingots and billets on the books of the members amounted to 17,421 net tons.

## News From Correspondents

### New England States

#### Waterbury, Connecticut

SEPTEMBER, 1, 1932.

Local industrial leaders are generally agreed that the turn has come in the tide of business. Most of them say there has already been an improvement, although it is so slight as to be barely perceptible. However, they are all agreed that the signs point to improvement by fall, as many reassuring changes have taken place.

John A. Coe, president of the American Brass Company, says there has been an increase in activity in local factories, but it has been small and spotty. "However," he says, "a better feeling exists everywhere. Some men have been put back to work. If conditions grow no worse more will be put back. I believe there has been some increase throughout the country the last month. Things are moving in the right direction now and tending toward an increase rather than a decrease in buying and manufacturing."

Edward O. Goss, president of the Sco-

vill Manufacturing Company, says he believes there will be a decided improvement in business before fall. He expressed doubt as to there having been any material improvement in business locally within the last month, but said:

"There has been an improvement in sentiment. There have been many healthy signs indicating the tide has turned. Establishing of the Reconstruction Finance Corporation and other similar measures have been very helpful and should result in still more improvement within a few months." He agreed that those who are taking an optimistic view of the next few months are justified and that reports of improved business throughout the country are well founded.

Frederick S. Chase, president of the Chase Companies, Inc., believes business is on the upgrade, saying:

"There has been a slight increase in business since the first of August. This may have been due to the rise in the price of copper, as it usually happens when cop-

per begins to rise, buyers who have been holding off and buying from hand to mouth begin to buy to cover for the future. Whether or not this increase in business is significant we do not know as we do not know whether it was for ordinary maintenance requirements or not. As to the prospect of increasing business in the fall, we believe the chances are for increased orders rather than for any lessening of our present volume."

Lewis S. Reed, executive vice-president of the Citizens and Manufacturers Bank, largest in Waterbury, declares business really is better locally as well as throughout the country generally.

General Manager W. A. Tobler of the Remington Arms Company, Bridgeport, says their 1,600 employees have had a good summer as the factory has enjoyed full time. "We slowed down some in August, but expect to pick up in September," he said. "Increased prices of farm products has helped manufacturing already and will mean still more improvement shortly."

Officials of the American Tube and Stamping plant, owned by Stanley Works of New Britain, say the outlook for business is now brighter than at any time for two years. Increased activity is expected by fall.

Manager Max L. Waterman of the Singer Manufacturing Company, says his organization expects a general pick-up in business by fall.

Hamilton Merrill, manager of the Manning, Maxwell and Moore Company, says: "We are optimistic and look for a pick-up this fall. All our information and contacts assure us that the worst of the depression is behind us and that we are on the up-grade. We look for improvement in September that will be substantial, but there will undoubtedly be much suffering this winter just the same. Our company has such faith in the future it has just purchased the Hook Box Crane Company, which will be operated at Muskegon, Mich."

W. R. B.

### Western Massachusetts

SEPTEMBER 1, 1932.

There is optimism among metal manufacturers in Western Massachusetts. Better morale is widespread and is accompanied in certain cases by an increase in business which has made it possible for employers to recall many workers.

According to reports from the **Gilbert and Barker Company** plant, they will increase their staff by a considerable number next week; it had been planned earlier to keep the plant more or less inactive, due to lack of orders. Orders for pumps are fairly good at present. The oil burner department business is showing a pick-up, with further gains in prospect for the fall. Close study is being given on refrigeration and air conditioning and officials say that an active start will be made on production in this field within another year.

**Perkins Machine and Gear Company** reports better business, with things on the upgrade. More men are to be recalled.

**Howard L. Washburn** at the **Metal Saw and Machine Company**, Springfield,

Mass., says that new orders for band saws reflect more activity in that field than has been manifest for many weeks.

According to **Austin C. Ross**, president of the **Rolls Royce of America, Inc.**, business at their plant has been decidedly better for the past few weeks, and prospects for the future are much brighter.

According to officials at the **Hastings and Schoen** plant in this city, the pattern shop is more active and more inquiries are being received.

**Irving Scheen** at the **Hampden Brass Company**, Springfield, Mass., says the foundry is running close to normal, the foundry's executives report a moderate improvement in operations.

**Charles Van Norman** of the **Van Norman Machine Tool Company** states that the plant is running along with some of the men on full time and others working only part of the time. The machine tool department is quiet, the president states, but the business in the auto equipment department is moving evenly. He is confident as to future

prospects, but says that his optimism has not as yet been backed up by orders.

**Phelps Brown** of the **Wico Electric Company** is decidedly optimistic over the prospects at his plant in spite of the fact that he is employing a staff only on a half time basis.

Officials at the **Chicopee Westinghouse** plant are very optimistic and by the middle of September expect that a decided trend toward improvement will be manifest. A fair volume of orders from the government has been received but is not expected to get under way for several weeks.

**More Drop Forging Company** officials report a falling off in orders from an automotive concern, but they expect orders will be resumed and business will reopen with increased volume when that concern completes the redesigning of one of its cars.

**United American Bosch Company** officials are pleased with future prospects, although business is comparatively quiet now. G. B. Y.

## Middle Atlantic States

### Central New York

SEPTEMBER 1, 1932.

The fall outlook in Rome is "not very healthy," according to **John D. Strain**, manager of the **Industrial Association**, which tabulates and charts labor trends in the metal trades in New York State. "No very rosy picture can be painted of the situation in that city," Mr. Strain said after holding his late summer conferences with industrial leaders in the non-ferrous metal plants in the Copper City. "The upward trend must be much more noticeable before the Rome plants will experience any appreciable reflex."

A canvass among metal manufacturers of this area resulted in many of the executives granting that "there seems to be a better feeling about business" but without any of them caring to be quoted about their particular business or its present condition as compared with previous months.

A gain of about one per cent in employment in the metal trades is shown for the Rome-Utica area in the last report of the **Industrial Association**.

**George L. Brunner**, treasurer and general manager of the **Brunner Manufacturing Company**, Utica, who manufactures compressors, reports a slight pick-up in business which came rather unexpectedly to offset the usual midsummer slump.

**Richardson and Boynton's** foundry, Rome, N. Y., will soon start up again, employing about 200 men after a six week shutdown, while the **International Heater Company**, which has been closed for six weeks, has started operations again, employing about 200.

Four novel characteristics of an alloy

of copper, silicon, tin and zinc have been granted protection by a patent issued to **Richard A. Wilkins**, Rome. The rights have been assigned to the **Revere Copper and Brass, Inc.**, of that city.

**Rene Decker**, 45, Ilion, head polisher in the **Remington Arms** plant, died suddenly while at work in the plant last month. E. K. B.

### Trenton, New Jersey

SEPTEMBER 1, 1932.

Although some New Jersey industrial concerns report placing additional men at work, Trenton companies declare business does not show any encouraging upward trend. **Trenton Brass and Machine Company** was compelled to lay off some help and the older employees are working but part time.

**John A. Roebling's Sons Company** denied a rumor that 1,000 additional men were to be given employment. **Edgely Brass Company**, of Edgely, Pa., formerly the **Trenton Emblem Company**, announces that business continues at a low ebb. The smaller metal industrial shops report no material increase in orders.

**John A. Roebling's Sons Company** has let a contract for the erection of a one-story concrete wire storage building on the south side of Mott Street. The structure will cost \$6,000. The company has received a refund of \$29,454 from the Department of Internal Revenue at Washington, D. C., as tax overcharge.

**Thomas A. Mostyn**, traffic manager of the **John A. Roebling's Sons Company**, has been elected president of the **Trenton Traffic Club**, while **J. G. Brady**, production manager of the **Westing-**

house Lamp Company, was made vice-president.

Following concerns have been incorporated: **Atlas Sanitary Products Co.**, North Wildwood; chemicals; \$125,000. **Federal Metal Products Corp.**, Jersey City; 2,500 shares. **Best Mfg. Co.**, Bloomfield; 500 shares. **Gresco & Julian, Inc.**, Wildwood; metal products; \$125,000. **Lohe Products Corp.**, Bayonne; welding and tempering; capital, \$2,500.

C. A. L.

### Newark, New Jersey

SEPTEMBER 1, 1932.

**Rare Metals Products Company**, Belleville, N. J., has sold its one-story factory building and adjoining property to the Buenavista Holding Company. The new owners are manufacturers of textile chemicals. Alterations will be made and an addition erected.

**Roto Engraving Company**, East Bound Brook, N. J., whose plant was destroyed by fire several months ago, has leased from the **Oilless Bearing**

**Company**, Lincoln, two large plants. The Roto Company has an abundance of orders to fill and will start operations shortly. Twenty-four tons of copper cylinders used to print the designs were untouched by the fire.

Following Newark concerns have been incorporated: **Owl Electric Lamp Co.**; electric lamps; 1,000 shares. **National Reproduction Co.**; manufacture enamels; 5,000 shares. **Essex Metal Alloys Co., Inc.**; smelting and refining metals of all kinds; 100 shares. C. A. L.

## Middle Western States — Pacific Coast

### Detroit, Michigan

SEPTEMBER 1, 1932.

Much of promise is developing in industry not only in metropolitan Detroit, but throughout various sections of the state. Most of it, however, seems to be booked for the future. The big plants either are just getting under way or are laying plans. Inquiries are more frequent and numerous, but little in the way of releases of new business is apparent as yet. Most of the industrial leaders are looking for a considerable improvement about the middle of September.

A break certainly must be near at hand. Inventories are largely exhausted, machinery is wearing out, and the need of replacement is apparent everywhere. Fear which has been so dominant is beginning to fade and confidence taking its place.

In Detroit one naturally turns towards the motor car industry for the first evidences of better things from a production standpoint. One of the first to show evidence of coming to life again is the **Hudson Motor Car Company**, which has increased its working force to approximately 10,000 men, efforts being centered largely on the new Essex "Terraplane" car. Increased activity on the part of the Hudson organization also has speeded up activities in the plant of the **Motor Wheel Corporation** at Lansing.

**Spencer-Smith Machine Company**, Howell, Mich., manufacturers of pistons, has reopened after a two-week shut-down, with a six-hour day and a 36-hour week schedule. **William McPherson Smith**, secretary and treasurer, says that trade now is holding close to normal and that the organization has been filling orders largely from stock, which is now so run down it has been found necessary to reopen the plant. He further says if business with manufacturers continues to improve the company will be obliged to increase the present number of production hours.

**Fred Wardell**, president of **Eureka Vacuum Cleaner Company**, says his company's inventories practically are exhausted and orders on hand necessitate

reopening the plant, which has been inactive for almost a year. Orders are going out for materials and operations will be built up to full production by or before November 1.

**Mueller Brass Company**, Port Huron, has contracts to supply 500,000 forgings, valued about \$30,000, for army ordnance.

**Buick** is undergoing annual inventory. A number of the plants will be re-organized for increased efficiency in manufacturing, according to **I. J. Reuter**, president and general manager. Men not engaged in this have been laid off temporarily. Buick produced and shipped 2,300 cars in July, compared with 3,200 in June and 5,320 in July, 1931.

**Fisher Body** recently closed for summer inventory. After this operations probably will be resumed with renewed vigor. The die-making departments of both the Fisher and the Pontiac organizations at Pontiac are busy at present on experimental work to be incorporated in the Pontiac models for 1933. It is understood both plants will be under way on production before Oct. 1.

**Norge Corporation**, Muskegon, has announced a new policy which will double the present payroll on the basis of four-days a week. Nearly 1,000 employees will be given from six to eight hours employment daily.

**A. C. McCord**, president. **McCord Radiator and Manufacturing Company**, announces production of a new type of radiator for the new Ford V-eights in his plant has reached about 1,000 daily. He predicts the schedule shortly will be run up to 1,500 daily.

Announcement comes from the **Wilcox-Rich** plant, Marshall, Mich., working exclusively on a contract supplying Ford valves, has increased its payroll more than ten per cent since July 1. Approximately 400 men are employed.

**C. L. Lamson**, president of **Penberthy Injector Company**, announces that his company showed an improvement in July over June, and August records likewise indicate an increase over July.

Operations of **Bennett Pumps Corporation**, Muskegon, Mich., have been halted, and all production units handling gasoline pumps and other Bennett prod-

ucts transferred to the Conshohocken, Pa., plant of **Service Station Equipment, Inc.**, of which Bennett is a subsidiary. Economy of operation is the reason. Officials give assurance that the Muskegon plant will be re-opened when normal conditions return.

**Universal Lubricator Company**, Detroit, was recently incorporated. The capital stock is \$20,000.

**Clarence E. Bement** has resigned as vice-president and general manager of the **Novo Engine Company**, Lansing, to become chairman of the board. He will be succeeded by **Eric P. Teel**, formerly general superintendent. F. J. H.

### Cleveland, Ohio

SEPTEMBER 1, 1932.

The month has been quiet, with big manufacturing plants marking time in anticipation of better things for the late fall. A much better feeling prevails, which augurs well for the future.

Manufacture of valves for **General Motors Corporation** has become exclusively a Cleveland industry. Concentration of this production, amounting to more than \$1,000,000 a year, at the plant of **Thompson Products, Inc.**, here, has been announced. Under the new arrangement, Thompson acquires General Motors' own valve plant and equipment at Muncie, Ind., and is about to begin the removal of it to Cleveland. In consequence the Thompson plant will increase its employment by several hundred, adding to its normal payroll 1,500 men, in order to handle the increased business which also has been augmented by a \$500,000 contract from the **Chrysler Corporation**.

More than 3,000 workers have been recalled to the plants at Toledo within the last few weeks, the first sizable gain in employment reported in the last year or two. The Merchants' and Manufacturers' association announces that the 51 major plants reporting to it have added 1,281 workers since July 1. The 51 plants represent about 30 per cent of the Toledo industrial employment. Thus it is estimated that 3,000 wage earners have gone back to work since July 1. F. J. H.

### Wisconsin Notes

SEPTEMBER 1, 1932.

Indications are that business is showing an improvement in the metal industry in Wisconsin. In some instances definite signs are available, while in others manufacturers feel that the improved sentiment which is fairly general will do much to stimulate business for the fall and winter months.

An out of season upturn in orders for hardware was reported by the **Milwaukee Stamping Company**, which does various metal work in addition to nickel, brass and bronze plating. In July, ordinarily one of the low months of the year for hardware manufacturers, the pay roll of the firm was increased 20 per cent over that of June, which this year marked the bottom of the summer slump for the company, according to **Edwin B. Bartlett**, president. A further increase is being shown in August, he said.

**Geuder, Paeschke and Frey Company**, Milwaukee, is optimistic concerning the future. After 52 years in the hardware trade turning out tin and galvanized ware, the company has added a new line, oil and gasoline service station equipment, with 18 new representatives providing national representation.

**Greene Manufacturing Company**, Racine, a leader in engineering, plating and metal working there, is contemplating several new developments of importance, which, barring unforeseen circumstances, should enable the company still further to increase its activities, according to officers. Although the report of the fiscal year ending June 30 showed a small deficit, the company's financial position is reported strong. **Carl P. Albert** has been elected president and treasurer, to succeed the late **Fred J. Greene**.

**S. A. Perkins**, 71, one of Waukesha's leading industrialists and a director of the **Werra Aluminum Company** of that city, died August 15. He is survived by a brother and a sister. W. T. N.

### Los Angeles, Calif.

SEPTEMBER 1, 1932.

The mining revival in California and adjoining territory is reflected in improved industrial conditions generally, especially machinery, steel, metals, etc. The Metal Trades Association reports general improvement in business. It has 55 member companies.

**Chrysler Corporation** is opening its new automobile factory in Los Angeles this month. It cost \$2,000,000.

The **Ford and Willys-Knight** plants here are operating steadily but still on curtailed schedules.

**Columbia Steel Corporation**, Torrance, Calif., will spend \$400,000 for plant additions, largely to supply the demand for automotive products.

**Western Machinery and Stamping Works**, 640 Natonia Street, San Francisco, is a new company making pumps and dies. **R. Ostendahl** is manager.

**West Coast Electric Works**, 160 Tenth Street, San Francisco, has started rebuilding electrical equipment.

**Copalite Signal Company**, Phelan

Building, San Francisco, will manufacture street signals and signs. **Fred Burkhardt** is president.

**Elkington-Hellwig Manufacturing Company**, 621 Minna Street, San Francisco, has reorganized. Company makes dishwashing machinery. **J. E. Elkington** is manager.

**Great Northern Tool and Supply Company**, Billings, Mont., is now distributing agent for Lincoln Electric Company throughout Montana and Wyoming.

**A. C. Wagner** has bought property at

Bryant and Harriet Streets, San Francisco, to put up a metal manufacturing plant.

**C. S. Warnock** has started a plant at 825 North Hobart Boulevard, Hollywood, to make air conditioning equipment for cars, buses, etc.

**Boeing Airplane Company**, Seattle, Wash., has built three new shops for control surface, body and bench work, and a new machine shop for metal working, welding, plating and finishing; also a shop for cable, wings, woodwork and assembly. H. S.

## Other Countries

### Birmingham, England

AUGUST 19, 1932.

Industry is now passing through a season of exceptional dullness customary at vacation time. The first week in August all the metal working factories were closed to give employees an opportunity to take a rest. This year the quietude of trade is more marked, and it is expected that August will add little to order books. There is a hopeful tone in respect of a revival of business in the autumn, although it is realized that any improvement will necessarily be slow.

Prices of non-ferrous metals have shown a slight increase in the last few days. Although the market is dull, values are higher than they were a month ago, and if this continues there is likely to be more confidence among buyers.

Demand for metal components for motor cars has kept up fairly well despite the quietness of motor car builders in Birmingham and district. The latter, however, are now making preparations for the coming season. Some important motor firms have announced programs for the new season and placed contracts which will ensure a period of activity when industry settles down after the holidays. Electrical engineering firms are also anticipating a busy period. This industry has maintained activity at a fair level.

Aluminum hollowware firms are doing a fair business, especially in domestic electric goods which are growing in popularity because of the extended use of electricity in housing.

Makers of copper and brass tubes have been suffering from the depression prevailing everywhere. The quietness of the shipbuilding industry has meant a very restricted demand for tubes, and there is no sign of any expansion in that department. Copper tubes for water conveyance are being used extensively in house building, but progress in this direction has been retarded owing to financial stringency among builders. The building trade has been severely decreased by the curtailment of schemes involving local and national expenditure.

Brass founders have been operating on a restricted scale for some time, but in some branches there is a feeling that the autumn will see more active conditions. Import duties will be of benefit in competing against goods made in Europe, but up to now the existence of huge stocks of imports brought in before the operation of the tariff has prevented any marked revival. Buying for the winter season will commence shortly in fittings trade supplying gas and electric lighting accessories.

The position of employment in industry generally shows no improvement.

J. A. H.

## Business Items—Verified

**U. S. Industrial Alcohol Company**, New York, is installing 15 new fermenters as a means of modernizing production facilities. This is significant because the alcohol industry has recently scrapped several obsolete units.

**York Burner Company**, York, Pa., manufacturer of oil burners and oil-burning equipment, has increased production schedule with larger working force. The company has recently arranged expansion program at plant.

**L. O. Koven and Brother**, Jersey City, N. J., metal products manufacturers, have erected a large monel metal cross over the spot where the late **Theodore Koven**, president of the firm, was killed

while climbing Mt. McKinley, Alaska, last May.

**A-B Stove Company, Inc.**, Battle Creek, Mich., has acquired manufacturing rights to a line of electric ranges, which it will produce in addition to its line of gas ranges. Five models are included in the new line, according to **R. W. Lynn**, sales manager.

**Universal Foundry Company**, Oshkosh, Wis., has added equipment for producing brass and bronze commercial castings in addition to its gray iron, alloy iron and aluminum castings. The following departments are operated by the company: brass, bronze and aluminum foundry.

# Metal Market Review

By R. J. HOUSTON

D. Houston and Company, Metal Brokers, New York

**Nicaluminum Company**, Jackson, Mich., headed by Victor Hybinette, is producing a new type of aluminum alloy, using a minimum of copper and a larger proportion of nickel and chromium than heretofore employed. The material is for automotive and aviation applications, having high strength, ductility and lustre.

**Miller's Brass Foundry**, 259 Hertel Street, Three Rivers, Que., Can., was completely destroyed by fire May 19. Operations were resumed May 27 in temporary quarters built on the old site. The company intends to build a modern foundry in the near future. This firm operates the following departments: brass, bronze and aluminum foundry; polishing.

**Pfaudler Company**, Rochester, N. Y., is adding plant facilities for manufacture of all-welded tanks up to 10,000 gallons capacity. They will have what is to be the world's largest oil-fired muffle type furnaces and suitable cranes for handling tanks weighing up to 25,000 pounds. Company is a large producer of glass-lined vessels for dairy and chemical industries.

**Watson Manufacturing Company**, 2100 Taylor Street, manufacturer of metal furniture, steel and bronze bank fixtures, etc., has undergone reorganization and is continuing operation as in the past, under the same name. **W. W. Watson** is secretary-treasurer. Company operates following departments: tool room, cutting-up, stamping, soldering, brazing, grinding, plating, polishing, lacquering and japanning.

**Abar Metal Products, Inc.**, has taken over equipment of the **Barsteel Products Company** and is operating at 111 Power Avenue, Cleveland, Ohio, manufacturing automatic screw machine products and parts for the plumbing and heater industry, such items being made of brass, nickel-silver and stainless steel. The firm operates a brass machine shop. It is stated that in the near future they will be in the market for a used Brown and Sharp No. 00 automatic screw machine.

## New Companies

**Kitchen Maid Corporation**, Huntington, Ind., will manufacture wood and metal kitchen equipment. **R. E. Wasmuth** heads the firm.

**R. C. Teel**, 427 Norton Avenue, Sylacauga, Ala., is contemplating manufacture of metal caskets and seeks data on materials and equipment, such as 18 to 24 gauge sheet iron, zinc, brass, etc., and slitting or cutting shears for such metals.

**Gilbert Brass Foundry**, St. Louis, Mo., has been organized to take over and succeed **A. Gilbert and Sons Brass Foundry Company**, 4015 Forest Park Boulevard, manufacturer of brass and other metal castings. Officers of the new company are **Charles F. Gilbert**, president; **E. C. Hetlinger**, vice-president; **Charles F. Gilbert, Jr.**, secretary. The following departments are operated: brass, bronze and aluminum foundry; brass machine shop, tool room, grinding room, habbitt.

## Copper

SEPTEMBER 1, 1932.

Consuming interest in the copper market was on a limited scale at the recently established prices of  $5\frac{1}{4}$  to  $5\frac{1}{2}$  cents per pound delivered in eastern territory. European demand was more active. August sales during the first half of the month were heavy. Large foreign buying was at advancing prices, and beginning at 4.75c in the early stage of activity continued until some transactions were booked at  $5\frac{1}{2}$  c. i. f. European ports. Domestic buyers finally came in the market for a good tonnage on expectation that there was a possibility of developments that would send prices higher.

It is quite possible that there may be some significant developments in the near future that will stimulate both business activity and market prices. Present production is being drastically curtailed at all sources. The industry cannot exist and prosper on the basis of a pound of copper for a nickel. This unreasonable inequality will be rectified eventually. With an upturn in general business in prospect more normal conditions are expected in copper during the coming months. The close was firm, more particularly for export, where a further fractional advance to 5.65c c. i. f. European ports. A keener interest in the market and higher prices are due at any moment. Present price levels are not expected to last much longer. Stronger features are developing in many directions.

## Zinc

Zinc had a firmer tone at close of month and prime western was 2.75c at East St. Louis and 3.12c New York basis. These quotations were 15 points higher than at the beginning of August. Buying was on a moderate scale as price showed signs of hardening, but the activity was not specially pronounced. The market was under less pressure, however, and altogether holders were more inclined to hold out for current quotations. Production has been sharply curtailed. Stocks at the end of July were 135,907 tons, an increase of 6,456 tons since April 1. New supplies have been kept down recently, but the outlet has not fully absorbed the smaller production.

## Tin

Market firmness was apparent from the start, particularly during the first half of August, and the general betterment lifted prices to the highest this year. The recovery movement gained steady impetus from  $21\frac{1}{2}$  c for prompt Straits tin on August 1 to 23.30c on August 16. The latter quotation was the highest this year and compared with a low in 1932 of 18.35c on April 14. Consuming demand was fairly active. Conservative interests seemed more impressed with the soundness of the situation. The salutary effects of curtailed out-

put and London pool operations are distinctly recognized in trade circles as advantageous for both producer and consumer. Recent measures have been constructive and have furnished a basis for prospects of an improving statistical position.

## Lead

Developments in lead reflected strength and activity in this commodity. Consumers have been heavy buyers lately in the belief that the market and business was due for substantial improvement. The market began to advance early in August and soon showed an upward tendency. The significance of this feature brought about a fairly good demand. Offerings were readily absorbed and during the second half of August further market strength developed which gave new momentum to consuming buying. Trading broadened out as the month progressed. Toward the last there was an advance to 3.40c New York and 3.25c East St. Louis. These prices compare with 2.95c New York and 2.85c East St. Louis at the beginning of August. Total sales for the past month were in heavy volume. There was a further increase of activity at the close and higher prices were probable.

## Aluminum

Current market prices for high grade aluminum remain unchanged despite quiet demand. Consuming requirements have not been specially urgent for some time past, but increased inquiries are expected to develop during the next few months when automobile manufacturers increase their operating schedules. Secondary aluminum has been in ample supply with prices easy. Revival of demand for remelted material is expected to appear in the near future, and better demand and firmer prices are confidently anticipated.

## Antimony

There has been less pressure to sell antimony lately. Chinese regulus for nearby and future delivery quotes  $5\frac{1}{4}$  cents per pound, duty paid, with business reported at this level in carload lots. Holders here and in China are firm at this level and are not disposed to entertain proposals for business at less price. Domestic demand was quiet at close of this report, with quotations slightly firmer at  $5\frac{1}{4}$  c to  $5\frac{3}{8}$  c, New York delivery.

## Quicksilver

The market for quicksilver has been generally easier. There has been a decline in prices, both here and in London, with sellers at \$45.50 per flask.

## Platinum

Dealings in platinum are on a restricted scale. The tendency of the market recently was downward, and refined platinum is quoted at \$31 to \$32 per ounce.



# Metal Prices, September 2, 1932

(Duties mentioned refer to U. S. tariffs on imports, as given in the Tariff Act of 1930.)

## NEW METALS

Copper: Lake, 6.125. Electrolytic, 6.00. Casting, 5.875.

Zinc: Prime Western, 3.25. Brass Special, 3.30.

Tin: Straits, 25.125. Pig, 99%, 23.95.

Lead: 3.45. Aluminum, 23.30. Antimony, 5.50.

Duties: Copper, 4c. lb.; zinc, 1 3/4c. lb.; tin, free; lead, 2 1/2c. lb.; aluminum, 4c. lb.; antimony, 2c. lb.; nickel, 3c. lb.; quicksilver, 25c. lb.; bismuth, 7 1/2%; cadmium, 15c. lb.; cobalt, free; silver, free; gold, free; platinum, free.

Nickel: Ingot, 35. Shot, 36. Elec., 35. Pellets, 40.

Quicksilver: Flash, 75 lbs., \$45.50. Bismuth, 85.

Cadmium, 55. Cobalt, 97%, \$2.50. Silver, oz., Troy (N. Y.)

official price September 6, 28.875.

Gold: oz., Troy, \$20.67. Platinum, oz., Troy, \$32.00 to \$37.00.

## INGOT METALS AND ALLOYS

	Cents lb.	Duty
Brass Ingots, Yellow .....	4 1/4 to 6 1/4	45%
Brass Ingots, Red .....	5 3/4 to 7	45%
Bronze Ingots .....	6 3/4 to 9 1/2	45%
Aluminum Casting Alloys .....	7 to 22	4c. lb.
Manganese Bronze Castings .....	16 to 35	45%
Manganese Bronze Ingots .....	6 to 10	45%
Manganese Bronze Forgings .....	26 to 35	45%
Manganese Copper, 30% .....	17 to 25	25%
Monel Metal Shot or Blocks .....	28	25%
Phosphor Bronze Ingots .....	7 to 10	45%
Phosphor Copper, guaranteed 15% .....	9 1/2 to 15	3c. lb.
Phosphor Copper, guaranteed 10% .....	9 to 14	3c. lb.
Phosphor Tin, no guarantee .....	27 1/2 to 40	Free
Silicon Copper, 10% .....	17 to 35	45%
Iridium Platinum, 5% .....	\$35.00	Free
Iridium Platinum, 10% .....	\$36.00	Free

## OLD METALS

Dealers' buying prices, wholesale quantities	Cents lb.	Duty
Heavy copper and wire, mixed .....	4 to 4 1/4	Free
Light copper .....	3 1/2 to 3 5/8	Free
Heavy yellow brass .....	2 1/4 to 2 1/2	Free
Light brass .....	1 3/4 to 2	Free
No. 1 composition .....	3 1/8 to 3 3/8	Free
Composition turnings .....	3 to 3 1/8	Free
Heavy soft lead .....	2 5/8 to 2 7/8	2 1/2c. lb.
Old zinc .....	1 1/8 to 1 3/8	1 1/2c. lb.
New Zinc clips .....	1 1/2 to 1 3/4	1 1/2c. lb.
Aluminum clips (new, soft) .....	9 1/2 to 10 1/2	4c. lb.
Scrap aluminum, cast, mixed .....	2 3/4 to 3	4c. lb.
Scrap aluminum, sheet (old) .....	7 to 7 1/2	4c. lb.
No. 1 pewter .....	13 1/2 to 14 1/2	Free
Electrotype or stereotype .....	2 1/4 to 2 1/2	2 1/2c. lb.*
Nickel anodes .....	20 1/4 to 22 1/4	10%
Nickel sheet clips; rod ends (new) .....	23 1/4 to 24 1/4	10%
Monel scrap .....	5 1/2 to 9	3c. lb.

\* On lead content.

## Wrought Metals and Alloys

The following are net BASE PRICES per pound, to which must be added extras for size, shape, small quantity, packing, etc., as shown in manufacturers' price lists, effective August 16, 1932.

### COPPER MATERIAL

	Net base per lb.	Duty
Sheet, hot rolled .....	14 7/8c.	2 1/2c. lb.
Bare wire .....	7 1/2c.	25%
Seamless tubing .....	13 3/4c.	7c. lb.
Soldering coppers .....	15 3/4c.	45%

### BRASS MATERIAL—MILL SHIPMENTS

	Net base prices per pound			
	High Brass	Low Brass	Bronze	Duty
Sheet .....	12c.	13 1/8c.	13 1/2c.	4c. lb.
Wire .....	12c.	13 1/8c.	13 1/2c.	25%
Rod .....	9 3/4c.	13 1/8c.	13 1/2c.	4c. lb.
Open seam tubing .....	19 3/4c.		21 1/4c.	25%
Angles, channels .....	19 3/4c.		21 1/4c.	12c. lb.
Seamless tubing .....	14 1/4c.		16 1/8c.	8c. lb.

### NICKEL SILVER (NICKELENE)

Net base prices per lb. (Duty 30% ad valorem.)

Grade "A" Sheet Metal	Wire and Rod
10% Quality .....	20 1/2c.
15% Quality .....	22 3/4c.
18% Quality .....	24c.
10% Quality .....	23 3/8c.
15% Quality .....	27 3/8c.
18% Quality .....	31 1/8c.

### TOBIN BRONZE AND MUNTZ METAL

	Net base prices per pound.	(Duty 4c. lb.)
Tobin Bronze Rod .....	13 1/2c.	13 1/2c.
Muntz or Yellow Metal Sheathing (14"x18") .....	14 1/8c.	14 1/8c.
Muntz or Yellow Rectangular sheet other sheathing .....	14 1/8c.	14 1/8c.
Muntz or Yellow Metal Rod .....	10 3/4c.	10 3/4c.

### ALUMINUM SHEET AND COIL

(Duty 7c. per lb.)

Aluminum sheet, 18 ga., base, ton lots, per lb. ....	32.30
Aluminum coils, 24 ga., base price .....	30.00

### ROLLED NICKEL SHEET AND ROD

(Duty 25% ad valorem, plus 10% if cold worked.)

Net Base Prices

Cold Drawn Rods .....	50c.	Cold Rolled Sheet .....	60c.
Hot Rolled Rods .....	45c.	Full Finished Sheet .....	52c.

### MONEL METAL SHEET AND ROD

(Duty 25% ad valorem, plus 10% if cold worked.)

Hot Rolled Rods (base) ...	35	Full Finished Sheets (base) ...	42
Cold Drawn Rods (base) ...	40	Cold Rolled Sheets (base) ...	50

### SILVER SHEET

Rolled sterling silver (September 6) 32.00c. per Troy oz. upward according to quantity. (Duty free.)

### ZINC AND LEAD SHEET

	Cents per lb.	Duty
Zinc sheet, carload lots, standard sizes		
and gauges, at mill, less 7 per cent discount ..	9.00	2c. lb.
Zinc sheet, full casks (jobbers' price) .....	9.25	2c. lb.
Zinc sheet, open casks (jobbers' price) ...	10.00 to 10.25	2c. lb.
Full Lead Sheet (base price) .....	6.75	2 3/4c. lb.
Cut Lead Sheet (base price) .....	7.00	2 3/4c. lb.

### BLOCK TIN AND BRITANNIA METAL SHEET

(Duty free)

This list applies to either block tin or No. 1 Britannia Metal Sheet, No. 23 B. & S. Gauge, 18 inches wide or less; prices are all f. o. b. mill:

500 lbs or over .....	15c. above N. Y. pig tin price
100 to 500 lbs. ....	17c. above N. Y. pig tin price
Up to 100 lbs. ....	25c. above N. Y. pig tin price

Lighter gauges command "extras" over the above prices.

# Supply Prices, September 2, 1932

## ANODES

Copper: Cast .....	16¼c. per lb.
Rolled, sheets, trimmed.....	14¼c. per lb.
Rolled, oval .....	13¼c. per lb.
Brass: Cast .....	14½c. per lb.
Zinc: Cast .....	.08¾c. per lb.

Nickel: 90-92% .....	41c. to 45c. per lb.
95-97% .....	42c. to 46c. per lb.
99% cast, 44c. to 48c.; rolled, depolarized, 45c. to 49c.	
Silver: Rolled silver anodes .999 fine were quoted September 6 from 32.00c., per Troy ounce upward, depending upon quantity.	

## WHITE SPANISH FELT POLISHING WHEELS

Diameter	Thickness	Under 50 lbs.	50 to 100 lbs.	Over 100 lbs.
10-12-14 & 16	1" to 2"	\$2.85/lb.	\$2.55/lb.	\$2.35/lb.
10-12-14 & 16	2 to 3½	2.75	2.45	2.25
6-8 & over 16	1 to 2	2.95	2.65	2.45
6-8 & over 16	2 to 3½	2.90	2.60	2.35
6 to 24	Under ½	4.15	3.85	3.65
6 to 24	½ to 1	3.85	3.55	3.35
6 to 24	Over 3½	3.25	2.95	2.75
Any Quantity				
4 to 6	Under ½	\$4.90	½-1, \$4.75	1 to 3, \$4.65
1½ to 4	"	5.45	" 5.30	" 5.25
1 to ½	"	5.75	" 5.60	" 5.50
Extras: 25c. per lb. on wheels, 1 to 6 in. diam., over 3 in. thick.				
On grey Mexican wheels deduct 10c. per lb. from above prices.				

## COTTON BUFFS

Full disc open buffs, per 100 sections, when purchased in lots of 100 or less:	
11" 20 ply 64/68 Unbleached.....	\$13.37 to \$15.60
14" 20 ply 64/68 Unbleached.....	21.60 to 25.65
11" 20 ply 80/92 Unbleached.....	17.00 to 18.45
14" 20 ply 80/92 Unbleached.....	26.37 to 30.40
11" 20 ply 84/92 Unbleached.....	21.69 to 22.95
14" 20 ply 84/92 Unbleached.....	35.37 to 37.80
11" 20 ply 80/84 Unbleached.....	21.69 to 22.40
14" 20 ply 80/84 Unbleached.....	35.37 to 37.00
Sewed Pieced Buffs, per lb., bleached.....	
41c. to 70c.	

## CHEMICALS

These are manufacturers' quantity prices and based on delivery from New York City.

Acetone .....	lb.	.09¼-.14	Lead Acetate (Sugar of Lead) .....	lb.	.09-.13
Acid—Boric (Boracic) granular, 99½+% ton lots.....	lb.	.04½-.05	Yellow Oxide (Litharge).....	lb.	.12½
Chronic, 75 to 400 lb. drums.....	lb.	.13 -.17½	Mercury Bichloride (Corrosive Sublimate).....	lb.	\$1.58
Hydrochloric (Muriatic) Tech., 20 deg., carboys.....	lb.	.02	Methanol, 100% synth., drums.....	gal.	.41½
Hydrochloric, C. P., 20 deg., carboys.....	lb.	.06	Nickel—Carbonate, dry bbls. ....	lb.	.32
Hydrofluoric, 30%, bbls. ....	lb.	.08-.12	Chloride, bbls. ....	lb.	.10-.21
Nitric, 36 deg., carboys .....	lb.	.06-.06½	Salts, single, 300 lb. bbls.....	lb.	.10½-.13
Nitric, 42 deg., carboys .....	lb.	.07-.08	Salts, double, 425 lb. bbls.....	lb.	.10½-.13
Sulphuric, 66 deg., carboys .....	lb.	.02	Paraffin .....	lb.	.05-.06
Alcohol—Butyl .....	lb.	11.30-18.00	Phosphorus—Duty free, according to quantity.....	lb.	.35-.40
Denatured drums .....	gal.	.475-.476	Potash Caustic Electrolytic 88-92% broken, drums.....	lb.	.06¾-.08¾
Alum—Lump, barrels .....	lb.	.03¾-.04	Potassium Bichromate, casks (crystals).....	lb.	.08½
Powdered, barrels .....	lb.	.03¾-.05	Carbonate, 96-98% .....	lb.	.065½
Ammonia, aqua, 26 deg., drums, carboys.....	lb.	.02¾-.05	Cyanide, 165 lbs. cases, 94-96%.....	lb.	.50
Ammonium sulphate, tech., bbls.....	lb.	.03¾-.05	Pumice, ground, bbls.....	lb.	.02½
Sulphocyanide .....	lb.	.28-.37	Quartz, powdered .....	ton	\$30.00
Arsenic, white, kegs .....	lb.	.04½-.05	Rosin, bbls. ....	lb.	.04¾
Asphaltum .....	lb.	.35	Rouge, nickel, 100 lb. lots.....	lb.	.25
Benzol, pure .....	gal.	.58	Silver and Gold .....	lb.	.65
Borax, granular, 99½+% ton lots.....	lb.	.02¼-.02¾	Sal Ammoniac (Ammonium Chloride) in bbls.....	lb.	.05-.05½
Cadmium oxide, 50 to 1,000 lbs.....	lb.	.55	Silver Chloride, dry, 100 oz. lots.....	oz.	.24½-.27½
Calcium Carbonate (Precipitated Chalk).....	lb.	.05¾-.07¾	Cyanide (fluctuating) .....	oz.	.31¾-.37½
Carbon Bisulphide, drums .....	lb.	.05½-.12	Nitrate, 100 ounce lots .....	oz.	.20¼-.23¼
Chrome Green, bbls.....	lb.	.19	Soda Ash, 58%, bbls.....	lb.	.023
Chromic Sulphate .....	lb.	.30-.40	Sodium—Cyanide, 96 to 98%, 100 lbs.....	lb.	.16½-.22
Copper—Acetate (Verdigris) .....	lb.	.20	Hyposulphite, kegs, bbls.....	lb.	.03½-.06½
Carbonate, bbls. ....	lb.	.14-.20	Metasilicate .....	lb.	.3.60
Cyanide (100 lb. kgs.).....	lb.	.39	Nitrate, tech., bbls. ....	lb.	.03¼-.07
Sulphate, bbls. ....	lb.	2.75-5.25	Phosphate, tech., bbls.....	lb.	.03¾
Cream of Tartar Crystals (Potassium Bitartrate).....	lb.	.20¼-.20¾	Silicate (Water Glass), bbls.....	lb.	.01½
Crocus .....	lb.	.15	Stannate .....	lb.	.21½
Dextrin .....	lb.	.05-.08	Sulphocyanide .....	lb.	.30 -.45
Emery Flour .....	lb.	.06	Sulphur (Brimstone), bbls. ....	lb.	.02
Flint, powdered .....	ton	\$30.00	Tin Chloride, 100 lb. kegs.....	lb.	.25½-.27
Fluorspar, bags .....	lb.	.04½	Tripoli, powdered .....	lb.	.03
Gold Chloride .....	oz.	\$12.00	Wax—Bees, white, ref. bleached.....	lb.	.60
Gum—Sandarac .....	lb.	.26	Yellow, No. 1 .....	lb.	.45
Shellac .....	lb.	.32-.34	Whiting, Bolted .....	lb.	.02½-.06
Iron Sulphate (Copperas), bbls.....	lb.	.01½	Zinc, Carbonate, bbls. ....	lb.	.11
Lacquer Solvents .....	gal.	.85	Chloride, drums, bbls.....	lb.	.06-.10
			Cyanide (100 lb. kegs).....	lb.	.38
			Sulphate, bbls. ....	lb.	.07-.14